

PRIMARY Standards Edition MATHEMATICS

EXTRA PRACTICE



Name: _____

Class: _____

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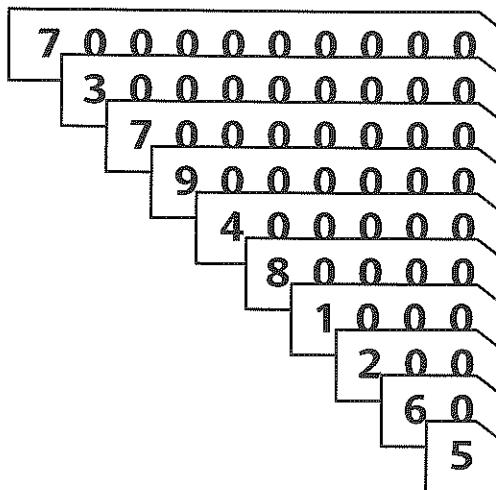
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Unit 1 : Whole Numbers

Friendly Notes

Billions

The number 7,379,481,265 can be represented as shown below.



Standard form: 7,379,481,265

Expanded form:

$$7,000,000,000 + 300,000,000 + 70,000,000 + 9,000,000 \\ + 400,000 + 80,000 + 1000 + 200 + 60 + 5$$

The number 7,379,481,265 written in words is seven billion, three hundred seventy-nine million, four hundred eighty-one thousand, two hundred sixty-five.



7,379,481,265
Starting from the right, each group of 3 digits forms a **period**.
Commas separate the periods.

Billions			Millions			Thousands			Ones		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
		7	3	7	9	4	8	1	2	6	5

The place value of 3 in 7,379,481,265 is hundred millions.

The digit 4 is in the hundred thousands place.

The value of the digit 9 is 9,000,000.

1 billion less than 7,379,481,265 is 6,379,481,265.

Which number is smaller, 8,425,678,900 or 8,455,678,837?

↓ ↓ ↓
8,4**2**5,678,900

8,4**5**5,678,837

Starting from the left, we compare the digits in each place value, until we find 2 digits that are different.



20 million is less than 50 million.

8,425,678,900 is smaller.

Approximation and Estimation

To round a number to a certain place value, we look at the digit in the next lower place value. If it is less than 5, we round down. If it is 5 or greater, we round up.

1. Round 1,345,826,917 to the nearest hundred million.

What digit is in the hundred millions place?

↓
1,345,826,917

What digit is in the next lower place value?

↓
1,345,826,917

Do we round up or down?

$1,345,826,917 \approx 1,300,000,000$

1,345,826,917 is approximately 1,300,000,000.

The sign ' \approx ' means approximately equal to.



2. Round 426,839,105 to the nearest ten million.

What digit is in the ten millions place?

↓
426,839,105

What digit is in the next lower place value?

↓
426,839,105

Do we round up or down?

$426,839,105 \approx 430,000,000$

426,839,105 is approximately 430,000,000.

3. Round each number to the nearest ten million.
Then estimate the value of

(a) $386,591,200 + 123,456,789$

(b) $827,356,409 - 453,608,721$

(a) $\begin{array}{c} \downarrow \qquad \qquad \downarrow \\ 386,591,200 + 123,456,789 \\ \approx 390,000,000 + 120,000,000 \\ = 510,000,000 \end{array}$

(b) $\begin{array}{c} \downarrow \qquad \qquad \downarrow \\ 827,356,409 - 453,608,721 \\ \approx 830,000,000 - 450,000,000 \\ = 380,000,000 \end{array}$

4. Estimate the value of

(a) $11,021,040 \times 5$

(b) $85,976,314 \div 3$

(a) $\begin{array}{l} 11,021,040 \times 5 \\ \approx 11,000,000 \times 5 \\ = 55,000,000 \end{array}$

(b) $\begin{array}{l} 85,976,314 \div 3 \\ \approx 90,000,000 \div 3 \\ = 30,000,000 \end{array}$

Factors and Multiples

Factors of a certain number divide the number exactly. A whole number can be expressed as a product of factors.

1. Find the factors of 18.

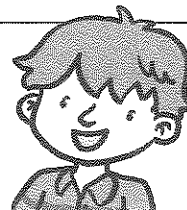
$$18 = 1 \times 18$$

$$18 = 2 \times 9$$

$$18 = 3 \times 6$$

The factors of 18 are 1, 2, 3, 6, 9 and 18.

18 can be divided by 1, 2, 3, 6, 9 and 18 exactly.



2. Is 5 a common factor of 25 and 60?



25 can be divided by 5 exactly.
So, 5 is a factor of 25.

60 can be divided by 5 exactly.
So, 5 is a factor of 60.



As 5 is a factor of both 25 and 60, it is a **common factor** of 25 and 60.

Multiples of a number can be obtained by multiplying the number by whole numbers.

3. List the first four multiples of 6.

$$1 \times 6 = 6$$

$$2 \times 6 = 12$$

$$3 \times 6 = 18$$

$$4 \times 6 = 24$$

The first four multiples of 6 are 6, 12, 18 and 24.

4. Is 98 a common multiple of 2 and 7?



$$\begin{array}{r} 49 \\ 2 \overline{) 98} \\ \underline{8} \\ 18 \\ \underline{18} \\ 0 \end{array}$$

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

Since 98 is divisible by both 2 and 7, 98 is a common multiple of 2 and 7.

Prime Factorization

A **prime number** is a whole number greater than 1 which has exactly two factors, 1 and the number itself.

A **composite number** is a whole number greater than 1 which has at least two factors that are not 1.

The numbers 0 and 1 are neither prime nor composite.

1. Identify
 - (a) the prime numbers,
 - (b) the composite numbers, in the following.

3, 4, 7, 21, 31, 47

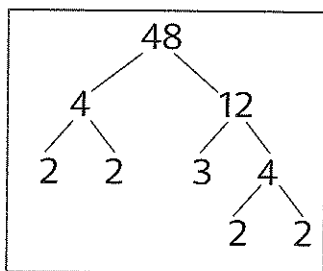
- (a) The prime numbers are 3, 7, 31 and 47.
- (b) The composite numbers are 4 and 21.

Prime factors are any factors of a number which are prime numbers.

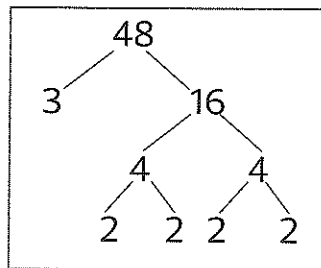
Prime factorization is the process of factoring a composite number into its prime factors.

2. Express 48 as a product of prime factors only.

Method 1: Use a factor tree.



or



$$\begin{aligned} 48 &= 2 \times 2 \times 2 \times 2 \times 3 \\ &= 2^4 \times 3 \end{aligned}$$

Method 2: Use continuous division, starting with the lowest prime number that is a factor.

2	48
2	24
2	12
2	6
3	3
	1

$$\begin{aligned} 48 &= 2 \times 2 \times 2 \times 2 \times 3 \\ &= 2^4 \times 3 \end{aligned}$$

In 2^4 , 2 is the base and 4 is the exponent.
The **exponent** tells us how many times to multiply the base with itself.

3. Write the following using exponents.

(a) $5 \times 5 \times 5 \times 5 \times 5 \times 5$

(b) $3 \times 3 \times 3 \times 3 \times 7 \times 7 \times 7$

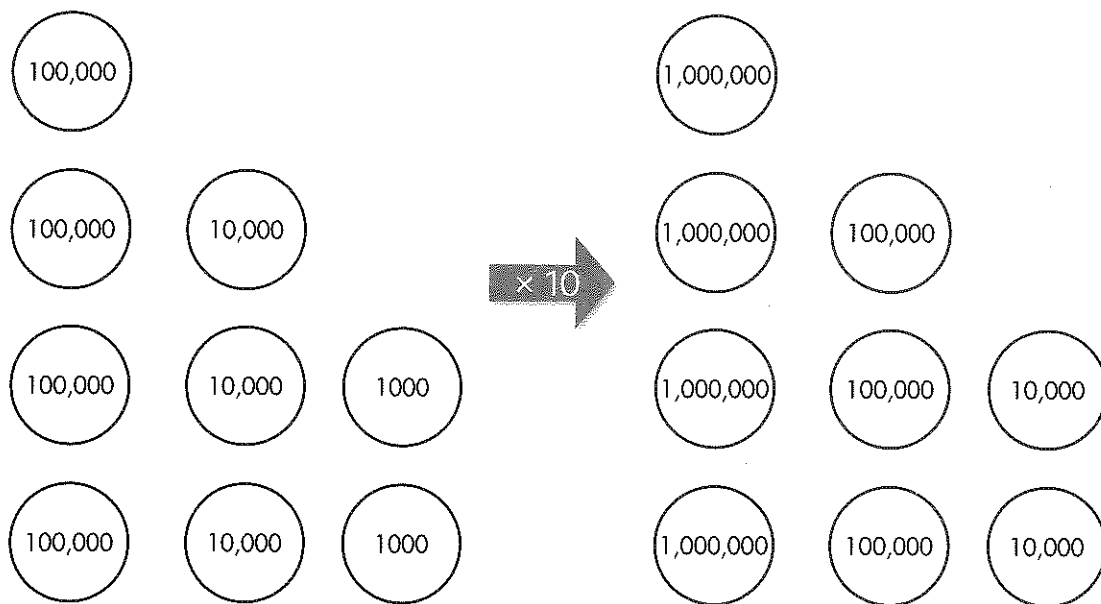
(a) $5 \times 5 \times 5 \times 5 \times 5 \times 5 = 5^6$

(b) $3 \times 3 \times 3 \times 3 \times 7 \times 7 \times 7 = 3^4 \times 7^3$

Multiplying by Tens, Hundreds or Thousands

When multiplying a whole number by 10, the number is increased 10 times.

1. Multiply 432, 000 by 10.

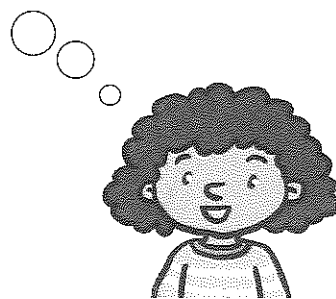


$$432,000 \times 10 = 4,320,000$$

2. Multiply 432,000 by 20.

$$\begin{aligned} 432,000 \times 20 &= 432,000 \times 2 \times 10 \\ &= 864,000 \times 10 \\ &= 8,640,000 \end{aligned}$$

Multiply 432,000 by 2 first.
 $432,000 \times 2 = 864,000$



When multiplying a whole number by 100, the number is increased 100 times.

3. Multiply 150,000 by 100.

$$150,000 \times 100 = 15,000,000$$

4. Multiply 150,000 by 300.

$$\begin{aligned} 150,000 \times 300 &= 150,000 \times 3 \times 100 \\ &= 450,000 \times 100 \\ &= 45,000,000 \end{aligned}$$

When multiplying a whole number by 1000, the number is increased 1000 times.

5. Multiply 240,000 by 1000.

$$240,000 \times 1000 = 240,000,000$$

6. Multiply 240,000 by 4000.

$$\begin{aligned} 240,000 \times 4000 &= 240,000 \times 4 \times 1000 \\ &= 960,000 \times 1000 \\ &= 960,000,000 \end{aligned}$$

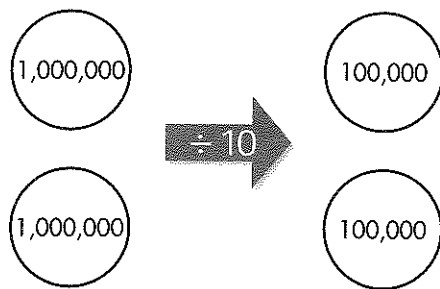
7. Estimate the value of $108,000 \times 2015$.

$$\begin{aligned} 108,000 \times 2015 &\approx 110,000 \times 2000 \\ &= 220,000,000 \end{aligned}$$

Dividing by Tens, Hundreds or Thousands

When dividing a whole number by 10, the number is reduced 10 times.

1. Divide 2,000,000 by 10.

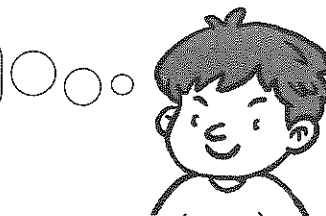


$$2,000,000 \div 10 = 200,000$$

2. Divide 32,000,000 by 20.

$$\begin{aligned} 32,000,000 \div 20 &= 32,000,000 \div 10 \div 2 \\ &= 3,200,000 \div 2 \\ &= 1,600,000 \end{aligned}$$

$$32,000,000 \div 20$$



When dividing a whole number by 100, the number is reduced 100 times.

3. Divide 600,000,000 by 100.

$$600,000,000 \div 100 = 6,000,000$$

4. Divide 270,000,000 by 300.

$$\begin{aligned} 270,000,000 \div 300 &= 270,000,000 \div 100 \div 3 \\ &= 2,700,000 \div 3 \\ &= 900,000 \end{aligned}$$

$$270,000,000 \div 300$$



When dividing a whole number by 1000, the number is reduced 1000 times.

5. Divide 800,000,000 by 1000.

$$800,000,000 \div 1000 = 800,000$$

6. Divide 750,000,000 by 5000.

$$\begin{aligned} 750,000,000 \div 5000 &= 750,000,000 \div 1000 \div 5 \\ &= 750,000 \div 5 \\ &= 150,000 \end{aligned}$$

7. Estimate the value of $5,558,300,200 \div 6955$.

$$\begin{aligned} 5,558,300,200 \div 6955 &\approx 5,600,000,000 \div 7000 \\ &= 800,000 \end{aligned}$$

Exercise 1 : Billions

1. Write the numbers.

- (a) Six million, two hundred forty-eight thousand, nine hundred three

- (b) Forty million, eight hundred twenty-seven thousand, six hundred

- (c) Nine hundred eighty-eight million, five hundred sixty thousand, two hundred one

- (d) One billion, six hundred thirty-five thousand

- (e) Three billion, eight hundred seventy-seven

- (f) Nine billion, fifty-four million, sixty-two

2. Write the numbers in words.

(a) 5,200,000

(b) 18,607,000

(c) 435,912,067

(d) 2,398,701,006

3. Write the following numbers in expanded form.

(a) 698,762,100

(b) 1,379,265,184

4. Write the missing numbers.

(a) $6,000,000 + 9000 + 300 = \underline{\hspace{2cm}}$

(b) $\underline{\hspace{2cm}} + 8,000,000 = 28,000,000$

(c) $300,000,000 + 70,000,000 + \underline{\hspace{2cm}}$
 $= 375,000,000$

(d) $\underline{\hspace{2cm}} + 90,000,000 + 1,000,000 +$
 $400,000 + 50,000 + 2000 + 700 + 30 = 891,452,730$

5. Fill in the blanks.

(a) Ten thousand less than 876,089,000 is $\underline{\hspace{2cm}}$.

(b) Ten million more than 56,327,400 is $\underline{\hspace{2cm}}$.

(c) $\underline{\hspace{2cm}}$ is one hundred thousand less than
10,832,456.

(d) $\underline{\hspace{2cm}}$ is one thousand more than
752,108,634.

6. Fill in the blanks.

In the number, 7,832,651,409,

(a) the value of the digit 2 is $\underline{\hspace{2cm}}$.

(b) the place value of the digit 6 is $\underline{\hspace{2cm}}$.

(c) the digit 8 is in the $\underline{\hspace{2cm}}$ place.

(d) the digit $\underline{\hspace{2cm}}$ is in the ten millions place.

7. Write $<$ or $>$ or $=$ in each \bigcirc .

(a) $98,793,100 \bigcirc 879,310,000$

(b) $465,399,228 \bigcirc 465,387,228$

(c) $51,738,260 \bigcirc 51,738,969$

(d) $9,386,254 \bigcirc 9,976,254$

Exercise 2 : Approximation and Estimation

1. Round each number to the nearest million.

(a) 8,732,999 _____

(b) 10,560,327 _____

2. Round each number to the nearest ten million.

(a) 24,320,257 _____

(b) 47,403,054 _____

(c) 813,794,626 _____

(d) 117,235,870 _____

3. Round each number to the nearest hundred million.

(a) 573,426,800 _____

(b) 6,928,375,140 _____

(c) 327,210,310 _____

(d) 6,824,003,004 _____

4. Round 5,194,736,280 to the nearest

- (a) hundred million _____
- (b) hundred thousand _____
- (c) million _____
- (d) ten thousand _____
- (e) ten million _____
- (f) thousand _____

5. Round 8,356,497,210 to the nearest

- (a) thousand _____
- (b) million _____
- (c) ten thousand _____
- (d) hundred thousand _____
- (e) hundred million _____
- (f) ten million _____

6. Round each number to the nearest million.
Then estimate the value of

(a) $8,475,623 + 3,501,211$

$$\approx \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

(b) $921,089,000 - 598,898,000$

$$\approx \underline{\hspace{2cm}} - \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

(c) $7,510,629 - 2,498,176$

$$\approx \underline{\hspace{2cm}} - \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

(d) $613,589,000 + 387,926,000$

$$\approx \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

7. Estimate the value of each of the following.

(a) $385,500 \times 3$

\approx _____ $\times 3$

$=$ _____

(b) $606,300 \div 6$

\approx _____ $\div 6$

$=$ _____

(c) $1,023,400 \times 4$

\approx _____ $\times 4$

$=$ _____

(d) $8,307,000 \div 5$

\approx _____ $\div 5$

$=$ _____

Exercise 3 : Factors and Multiples

1. Find the factors of each of the following numbers.

(a) 24

The factors of 24 are _____.

(b) 75

The factors of 75 are _____.

(c) 84

The factors of 84 are _____.

(d) 96

The factors of 96 are _____.

(e) 121

The factors of 121 are _____.

2. What number am I?

- (a) I am between 10 and 15.
I am a multiple of 2.
I am a factor of 48.

I am _____.

- (b) I am between 15 and 25.
I am a multiple of 5.
I am a factor of 40.

I am _____.

- (c) I am smaller than 35.
I am a common multiple of 6 and 10.

I am _____.

- (d) I am smaller than 24.
I am a common multiple of 7 and 3.

I am _____.

- (e) I am greater than 2.
I am a common factor of 6 and 9.

I am _____.

- (f) I am greater than 10.
I am a common factor of 65 and 117.

I am _____.

Exercise 4 : Prime Factorization

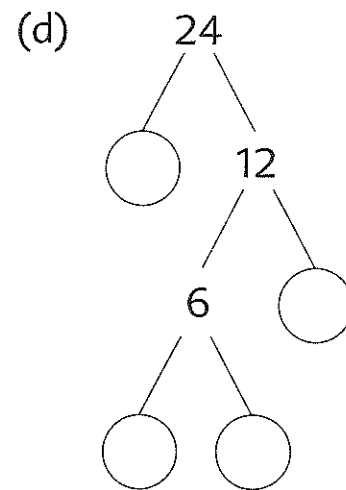
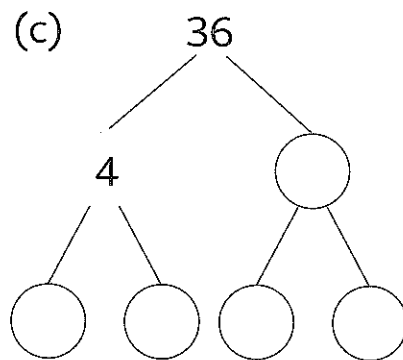
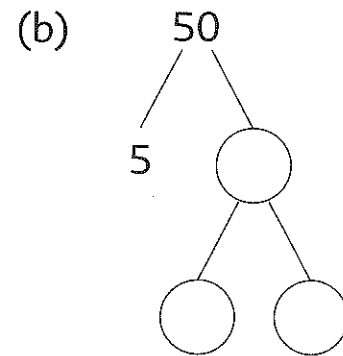
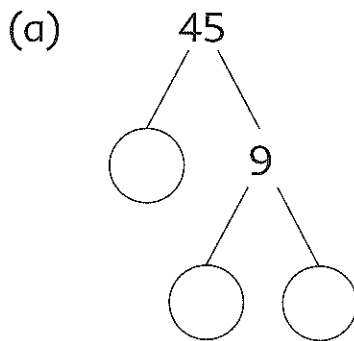
1. Write the prime factors of each of the following.

(a) 15 _____

(b) 20 _____

(c) 33 _____

2. Complete the following factor trees.



3. Rewrite the following using exponents.

(a) $11 \times 11 \times 11 =$ _____

(b) $2 \times 2 \times 2 \times 2 \times 2 =$ _____

(c) $7 \times 7 \times 7 \times 13 \times 13 =$ _____

(d) $5 \times 5 \times 5 \times 5 \times 3 \times 3 =$ _____

4. Find the value of each of the following.

(a) $2^6 =$ _____

(b) $7^3 =$ _____

(c) $5^2 \times 3^2 =$ _____

5. Write the prime factorization of the following using exponents.

(a) $28 =$ _____

(b) $36 =$ _____

(c) $40 =$ _____

Exercise 5 : Multiplying by Tens, Hundreds or Thousands

1. Find the value of each of the following.

(a) $347,000,000 \times 10$ =	(b) $408,000,000 \times 20$ =
(c) $24,000,000 \times 80$ =	(d) $93,000,000 \times 100$ =
(e) $5,900,000 \times 300$ =	(f) $758,000 \times 500$ =
(g) $236,000 \times 700$ =	(h) $514,000 \times 1000$ =
(i) $707,000 \times 4000$ =	(j) $62,000 \times 6000$ =

2. Estimate the value of each of the following.

(a) $38,456,300 \times 112$

$$\approx \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

(b) $62,454,700 \times 18$

$$\approx \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

(c) $705,800 \times 4024$

$$\approx \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

(d) $848,999 \times 56$

$$\approx \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

Exercise 6 : Dividing by Tens, Hundreds or Thousands

1. Find the value of each of the following.

(a) $590,000,000 \div 10$ =	(b) $900,000,000 \div 30$ =
(c) $7,770,000,000 \div 70$ =	(d) $2,300,000,000 \div 100$ =
(e) $360,000,000 \div 400$ =	(f) $78,000,000 \div 600$ =
(g) $4,500,000,000 \div 1000$ =	(h) $750,000,000 \div 3000$ =
(i) $30,000,000 \div 5000$ =	(j) $84,000,000 \div 7000$ =

2. Estimate the value of each of the following.

(a) $35,550,000 \div 18$

\approx _____ \div _____

$=$ _____

(b) $49,871,780 \div 505$

\approx _____ \div _____

$=$ _____

(c) $58,244,752 \div 2876$

\approx _____ \div _____

$=$ _____

(d) $2,084,596,460 \div 415$

\approx _____ \div _____

$=$ _____

Unit 2 : More Calculations with Whole Numbers

Friendly Notes

Calculations with Parentheses

Order of Operations:

Do multiplication or division from left to right, then addition or subtraction from left to right.

Compute the expression in parentheses first if any.

1. Find the value of $6 \times 8 + 30 \div 5 - 4 \times 9$.

$$\begin{aligned} 6 \times 8 + 30 \div 5 - 4 \times 9 &= 48 + 6 - 36 \\ &= 18 \end{aligned}$$



If the expression in the parentheses has different kinds of operations, use the order of operations.

2. Find the value of $300 \div (5 + 11 \times 5) - 8$.

$$\begin{aligned} 300 \div (5 + 11 \times 5) - 8 &= 300 \div (5 + 55) - 8 \\ &= 300 \div 60 - 8 \\ &= 5 - 8 \\ &= -3 \end{aligned}$$

Methods for Mental Calculation

When we add numbers close to 100 to another number, we can add 100 first and then subtract the difference between the number and 100.

1. Add 455 and 99.

$$\begin{aligned} 455 + 99 &= 455 + 100 - 1 \\ &= 555 - 1 \\ &= 554 \end{aligned}$$

$$100 - 99 = 1$$

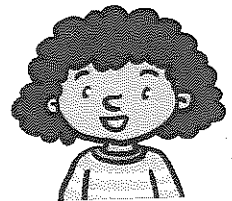


When we subtract numbers close to 100 from another number, we can subtract 100 first and then add the difference between the number and 100.

2. Subtract 98 and 367.

$$\begin{aligned} 367 - 98 &= 367 - 100 + 2 \\ &= 267 + 2 \\ &= 269 \end{aligned}$$

$$100 - 98 = 2$$



When we multiply mentally, we can multiply the tens, multiply the ones, and then add the products.

3. Multiply 85 by 6.

$$\begin{aligned}85 \times 6 &= 80 \times 6 + 5 \times 6 \\&= 480 + 30 \\&= 510\end{aligned}$$

4. Multiply 85 by 60.

$$\begin{aligned}85 \times 60 &= 85 \times 6 \times 10 \\&= 510 \times 10 \\&= 5100\end{aligned}$$

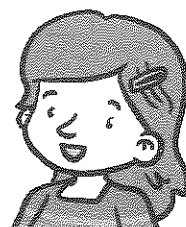
5. Multiply 67 by 99.

$$\begin{aligned}67 \times 99 &= 67 \times 100 - 67 \\&= 6700 - 67 \\&= 6633\end{aligned}$$

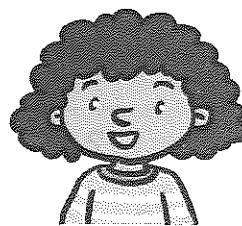
6. Multiply 36 by 25.

$$\begin{aligned}36 \times 25 &= 9 \times 4 \times 25 \\&= 9 \times 100 \\&= 900\end{aligned}$$

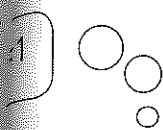
There are many different ways to multiply mentally. Here are some ways.



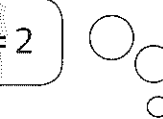
$$\begin{aligned}36 &= 9 \times 4 \\4 \times 25 &= 100\end{aligned}$$



number, we can
between the

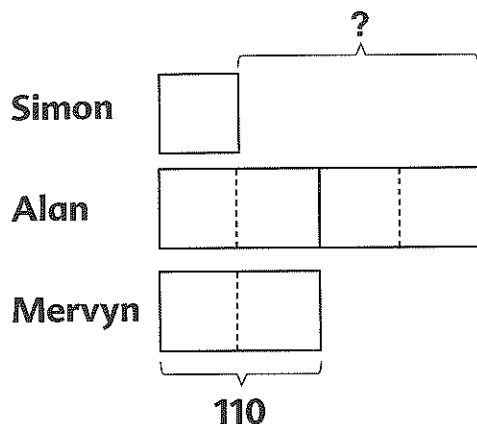


other number,
once



Word Problems

- Mervyn has 110 marbles. Alan has 2 times as many marbles as Mervyn and 4 times as many marbles as Simon. How many more marbles does Alan have than Simon?



When we draw the model, we draw Simon's part first as he has the least number of marbles.



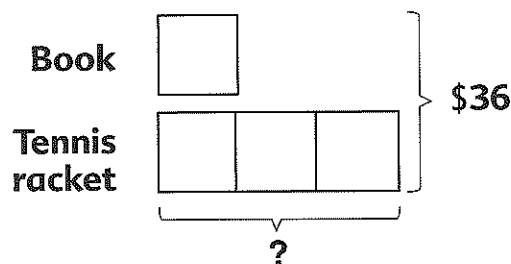
$$2 \text{ units} = 110 \text{ marbles}$$

$$1 \text{ unit} = 55 \text{ marbles}$$

$$3 \text{ units} = 165 \text{ marbles}$$

Alan has 165 more marbles than Simon.

- A tennis racket costs 3 times as much as a book. If the total cost of the book and the tennis racket is \$36, find the cost of the tennis racket.



$$4 \text{ units} = \$36$$

$$1 \text{ unit} = \$9$$

$$3 \text{ units} = \$27$$

The cost of the tennis racket is \$27.

Multiplication by a 2-digit Whole Number

1. Multiply 57 by 60.

Method 1:

$$\begin{aligned} 57 \times 60 &= 57 \times 6 \times 10 \\ &= 342 \times 10 \\ &= 3420 \end{aligned}$$

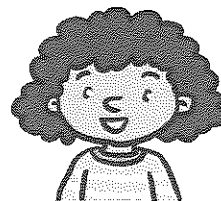
Method 2:

$$\begin{array}{r} ^4 57 \\ \times 60 \\ \hline 3420 \end{array}$$

2. Multiply 368 by 25.

$$\begin{array}{r} 368 \\ \times 25 \\ \hline 1840 \leftarrow 368 \times 5 \\ 7360 \leftarrow 368 \times 20 \\ \hline 9200 \end{array}$$

$$368 \times 25 = 368 \times 5 + 368 \times 20$$



many marbles
mon. How
on?

he model, we
first as he has
of marbles.

ok. If the total
find the cost

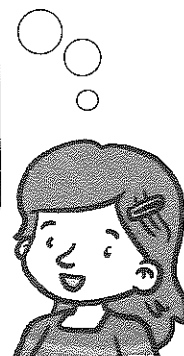
Division by a 2-digit Whole Number

1. Divide 98 by 36.

$$\begin{array}{r} 2 \\ 36 \overline{) 98} \\ \underline{72} \\ 26 \end{array}$$

$$\begin{array}{r} 2 \\ 40 \overline{) 98} \end{array}$$

$40 \times 2 = 80$ $40 \times 3 = 120$
The estimated quotient is 2.



2. Divide 225 by 25.

$$\begin{array}{r} 7 \\ 30 \overline{) 225} \end{array}$$

The estimated quotient is 7.



$$\begin{array}{r} 7 \\ 25 \overline{) 225} \\ \underline{175} \\ 50 \end{array}$$



$$\begin{array}{r} 9 \\ 25 \overline{) 225} \\ \underline{225} \\ 0 \end{array}$$

The estimated quotient is too small. Try 9.

Exercise 1 : Calculations with Parentheses

1. Find the value of each of the following.

(a) $26 - 17 + 15$ =	(b) $42 \div 6 \times 7$ =
(c) $7 \times 8 - 9$ =	(d) $27 \div 3 + 10$ =
(e) $12 + 5 \times 4 - 7$ =	(f) $24 \div 4 + 5 \times 2$ =
(g) $9 \times 4 \div 2 - 10$ =	(h) $4 + 35 \div 7 \times 3$ =
(i) $16 \div 8 + 8 - 2 \times 5$ =	(j) $11 + 6 \times 9 - 36 \div 4$ =

$$\begin{array}{r} 9 \\ 25 \overline{) 225} \\ \underline{225} \\ 0 \end{array}$$

(k) $9 \times (3 + 4)$ =	(l) $(63 - 8) \div 5$ =
(m) $33 - (7 + 4)$ =	(n) $120 \div (6 \times 2)$ =
(o) $8 \times 8 - (2 + 8)$ =	(p) $(30 - 3) \div 9 + 34$ =
(q) $81 \div (7 + 2) \times 10$ =	(r) $10 + (11 - 3) \times 5 \div 2$ =
(s) $3 \times 3 - 45 \div (4 + 1)$ =	(t) $5 \times (10 - 6) + 49 \div 7$ =

Exercise 2 : Methods for Mental Calculation

1. Find the value of each of the following mentally.

(a) $199 + 25$ $= 200 + 25 - 1$ $=$	(b) $213 + 499$ $=$
(c) $1109 + 599$ $=$	(d) $386 + 104$ $=$
(e) $1245 + 305$ $=$	(f) $2306 + 394$ $=$
(g) $405 - 299$ $= 405 - 300 + 1$ $=$	(h) $1299 - 499$ $=$
(i) $500 - 74$ $=$	(j) $2300 - 38$ $=$

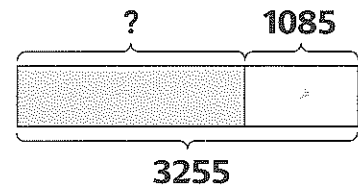
2. Find the value of each of the following mentally.

(a) 43×31 =	(b) 99×57 =
(c) 71×19 =	(d) 28×39 =
(e) 25×28 =	(f) 60×25 =
(g) 88×50 =	(h) 38×99 =
(i) 24×91 =	(j) 44×25 =

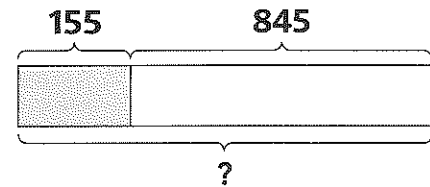
Exercise 3 : Word Problems

1. Find the missing numbers.

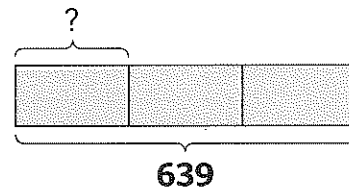
(a) _____ + 1085 = 3255



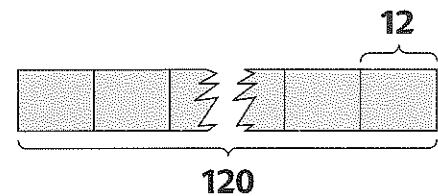
(b) _____ - 845 = 155



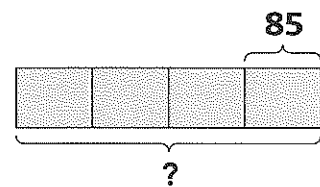
(c) 3 × _____ = 639



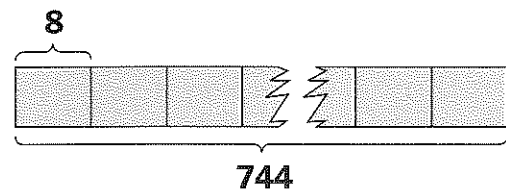
(d) _____ × 12 = 120



(e) _____ ÷ 4 = 85



(f) 744 ÷ _____ = 8



2. Do these. Show all your work clearly.

(a) Mrs. Jackson bought 23 dozen pencils. She gave 15 pencils to her students. How many pencils does she have left?

(b) Josephine bought 6 bags of marbles. Each bag contained 50 marbles. She shared them equally with John and Carlos. How many marbles did John get?

- gave
is does she
- (c) Book B has 10 times as many pages as Book A.
If Book B has 500 pages, how many pages do Book A
and Book B have altogether?

- bag contained
John and
- (d) Ahmad has 1200 rubber bands. He puts them equally
into 10 boxes. How many rubber bands are there
altogether in 6 of these boxes?

(e) Mrs D'cruz gives some money to her 3 sons and 5 daughters. Each son gets \$15. Each daughter gets \$18. How much money has she given to them altogether?

(f) Juan is 20 kg lighter than Mike who is 5 kg heavier than Nathan. If Mike weighs 50 kg, what is the total weight of Juan, Mike and Nathan?

(g) Last term, Oak Elementary School bought 15 chairs which cost \$450 altogether. This term, they bought another 25 similar chairs. How much did the school spend on chairs in the two terms?

(h) Nicole had \$50. She bought 35 pears. Every 5 pears cost \$4. How much money did she have left?

(i) A furniture store sold 56 cabinets and 73 bookshelves for \$32,375 altogether. Each cabinet cost \$350. What was the price of each bookshelf?

(j) A factory had to produce 7600 radios. The factory produced 600 radios each day for 8 days in the first stage. The remaining radios were produced over the next 4 days in the second stage. How many more radios were produced each day in the second stage?

Exercise 4 : Multiplication by a 2-digit Whole Number

1. Multiply.

(a) 39×28 =	(b) 128×50 =
(c) 207×40 =	(d) 385×37 =
(e) 3146×60 =	(f) 2069×71 =
(g) 4305×23 =	(h) 5723×14 =

$$\begin{array}{l} \text{(i)} \quad 27 \times 12 \\ = \end{array}$$

$$\begin{array}{l} \text{(j)} \quad 42 \times 30 \\ = \end{array}$$

$$\begin{array}{l} \text{(k)} \quad 63 \times 15 \\ = \end{array}$$

$$\begin{array}{l} \text{(l)} \quad 405 \times 25 \\ = \end{array}$$

$$\begin{array}{l} \text{(m)} \quad 599 \times 38 \\ = \end{array}$$

$$\begin{array}{l} \text{(n)} \quad 1603 \times 43 \\ = \end{array}$$

$$\begin{array}{l} \text{(o)} \quad 7896 \times 54 \\ = \end{array}$$

$$\begin{array}{l} \text{(p)} \quad 2762 \times 27 \\ = \end{array}$$

Exercise 5 : Division by a 2-digit Whole Number

1. Divide.

(a) $73 \div 20$ =	(b) $84 \div 31$ =
(c) $257 \div 40$ =	(d) $377 \div 62$ =
(e) $520 \div 74$ =	(f) $1515 \div 17$ =
(g) $1282 \div 53$ =	(h) $8447 \div 49$ =

(i) $659 \div 50$
=

(j) $98 \div 24$
=

(k) $191 \div 37$
=

(l) $2830 \div 13$
=

(m) $3457 \div 49$
=

(n) $4404 \div 55$
=

(o) $5845 \div 28$
=

(p) $6000 \div 62$
=

(q) $6585 \div 77$
=

(r) $8069 \div 53$
=

(s) $7081 \div 60$
=

(t) $9789 \div 89$
=

2. Do these. Show your work clearly.

- (a) There are 60 books on each shelf in a library. If there are 7080 books altogether in the library, find the number of shelves in the library.
- (b) There are 15 rows of chairs in a hall. If there are an equal number of chairs in each row and the total number of chairs is 285, find the number of chairs in each row.

Unit 3 : Fractions

Friendly Notes

Comparing Fractions

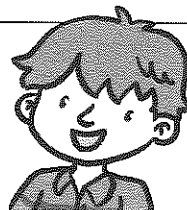
To compare fractions, we change them to **like fractions**.
Like fractions are fractions with a common denominator.
For like fractions, the greater the numerator, the greater the fraction.

Which is greater, $\frac{4}{5}$ or $\frac{5}{6}$?

$$\frac{4}{5} \xrightarrow{\times 6} \frac{24}{30}$$

$$\frac{5}{6} \xrightarrow{\times 5} \frac{25}{30}$$

To change the fractions to like fractions, we find equivalent fractions which have the same denominator.



To change to like fractions, we find the common multiple of the denominators.
30 is a common multiple of 5 and 6.

$\frac{25}{30}$ is greater than $\frac{24}{30}$.

So, $\frac{5}{6}$ is greater than $\frac{4}{5}$.

Fraction and Division

Find the value of $34 \div 8$.

Method 1:

$$\begin{aligned} 34 \div 8 &= 4\frac{2}{8} \\ &= 4\frac{1}{4} \end{aligned}$$

$$\begin{array}{r} 4 \\ 8 \overline{) 34} \\ \underline{32} \\ 2 \end{array}$$



Method 2:

$$\begin{aligned} 34 \div 8 &= \frac{34}{8} \\ &= \frac{17}{4} \\ &= \frac{16}{4} + \frac{1}{4} \\ &= 4\frac{1}{4} \end{aligned}$$

Reduce $\frac{34}{8}$ to its simplest form.



Addition and Subtraction of Unlike Fractions

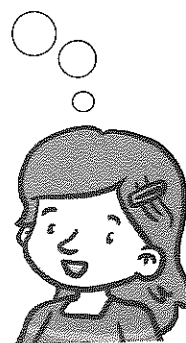
Unlike fractions are fractions which do not have the same denominator. When adding or subtracting unlike fractions, we change them to like fractions first.

1. Add $\frac{2}{3}$ and $\frac{3}{10}$.

$$\begin{aligned} \frac{2}{3} + \frac{3}{10} &= \frac{20}{30} + \frac{9}{30} \\ &= \frac{29}{30} \end{aligned}$$

$$\frac{2}{3}, \frac{4}{6}, \frac{6}{9}, \frac{8}{12}, \dots, \frac{20}{30}$$
$$\frac{3}{10}, \frac{6}{20}, \frac{9}{30}, \dots$$

30 is a common multiple of 3 and 10.



2. Subtract $\frac{2}{3}$ from $\frac{4}{5}$.

$$\begin{aligned}\frac{4}{5} - \frac{2}{3} &= \frac{12}{15} - \frac{10}{15} \\ &= \frac{2}{15}\end{aligned}$$

$$\frac{4}{5}, \frac{8}{10}, \frac{12}{15}, \dots$$

$$\frac{2}{3}, \frac{4}{6}, \frac{6}{9}, \frac{8}{12}, \frac{10}{15}, \dots$$

15 is a common multiple of 5 and 3.



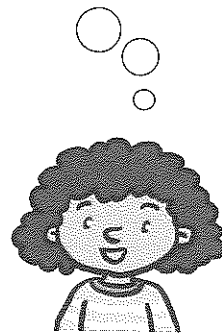
Addition and Subtraction of Mixed Numbers

When adding or subtracting mixed numbers, we add or subtract the whole numbers first and then the fractions.

1. Add $3\frac{1}{4}$ and $2\frac{3}{8}$.

$$\begin{aligned}3\frac{1}{4} + 2\frac{3}{8} &= 5\frac{1}{4} + \frac{3}{8} \\ &= 5\frac{2}{8} + \frac{3}{8} \\ &= 5\frac{5}{8}\end{aligned}$$

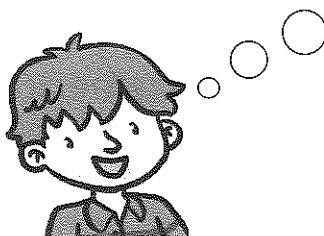
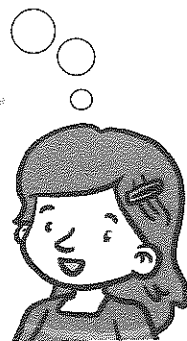
$$3\frac{1}{4} \xrightarrow{+2} 5\frac{1}{4} \xrightarrow{+\frac{3}{8}} 5\frac{5}{8}$$



2. Subtract $1\frac{5}{6}$ from $4\frac{3}{4}$.

$$\begin{aligned} 4\frac{3}{4} - 1\frac{5}{6} &= 3\frac{3}{4} - \frac{5}{6} \\ &= 3\frac{9}{12} - \frac{10}{12} \\ &= 2\frac{21}{12} - \frac{10}{12} \\ &= 2\frac{11}{12} \end{aligned}$$

$$\begin{aligned} 3\frac{9}{12} &= 2 + 1 + \frac{9}{12} \\ &= 2 + \frac{12}{12} + \frac{9}{12} \\ &= 2\frac{21}{12} \end{aligned}$$



$$4\frac{3}{4} \xrightarrow{-1} 3\frac{3}{4} \xrightarrow{-\frac{5}{6}} 2\frac{11}{12}$$

Multiplying a Fraction and a Whole Number

When multiplying a fraction by a whole number, we multiply the whole number by the numerator of the fraction.

Multiply 9 by $\frac{3}{10}$.

$$\begin{aligned} 9 \times \frac{3}{10} &= \frac{27}{10} \\ &= 2\frac{7}{10} \end{aligned}$$

$$\begin{aligned} 9 \times \frac{3}{10} &= \frac{3 \times 9}{10} \\ 9 \times \frac{3}{10} &= \frac{9 \times 3}{10} \end{aligned}$$

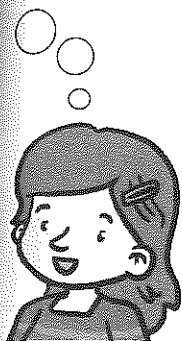


Fraction of a Set

1. Find $\frac{3}{5}$ of a liter in milliliters.

$$\begin{aligned}\frac{3}{5} \text{ of a liter} &= \frac{3}{5} \times 1 \ell \\ &= \frac{3}{5} \times 1000 \text{ ml} \\ &= \frac{3 \times 1000}{5} \\ &= \frac{3000}{5} \\ &= 600 \text{ ml}\end{aligned}$$

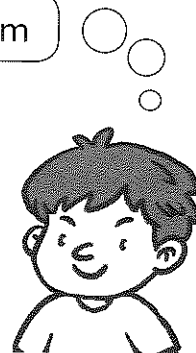
$$1 \ell = 1000 \text{ ml}$$



2. Find $\frac{3}{4}$ of a meter in centimeters.

$$\begin{aligned}\frac{3}{4} \text{ of a meter} &= \frac{3}{4} \times 1 \text{ m} \\ &= \frac{3}{4} \times 100 \text{ cm} \\ &= \frac{3 \times 100}{4} \\ &= \frac{300}{4} \\ &= 75 \text{ cm}\end{aligned}$$

$$1 \text{ m} = 100 \text{ cm}$$



er
we multiply
ion.

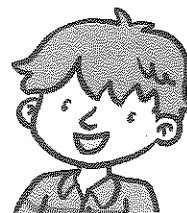
Word Problems

There are 42 children in a class. $\frac{1}{6}$ of them wear glasses.
How many children do not wear glasses?

Method 1:

$$1 - \frac{1}{6} = \frac{5}{6}$$

First, I find what fraction of the children do not wear glasses.



$\frac{5}{6}$ of the children do not wear glasses.

$$\begin{aligned}\frac{5}{6} \times 42 &= \frac{5 \times 42}{16} \\ &= 35\end{aligned}$$

35 children do not wear glasses.

Method 2:

$$\begin{aligned}\text{Number of children who wear glasses} &= \frac{1 \times 42}{6} \\ &= 7\end{aligned}$$

$$\begin{aligned}\text{Number of children who do not wear glasses} &= 42 - 7 \\ &= 35\end{aligned}$$

Method 3:

6 units = 42 children

1 unit = 7 children

$$\begin{aligned}\text{Number of children who do not wear glasses} &= 5 \text{ units} \\ &= 35\end{aligned}$$

Exercise 1 : Comparing Fractions

1. Circle the greater fraction.

(a) $\frac{8}{10}$, $\frac{3}{8}$

(b) $\frac{3}{4}$, $\frac{6}{7}$

(c) $\frac{1}{9}$, $\frac{2}{5}$

(d) $\frac{5}{6}$, $\frac{1}{4}$

(e) $\frac{9}{2}$, $\frac{5}{3}$

(f) $1\frac{2}{11}$, $1\frac{1}{4}$

2. Circle the smaller fraction.

(a) $\frac{5}{9}$, $\frac{4}{5}$

(b) $\frac{7}{10}$, $\frac{3}{4}$

(c) $\frac{7}{8}$, $\frac{4}{5}$

(d) $\frac{1}{6}$, $\frac{3}{5}$

(e) $\frac{11}{4}$, $\frac{13}{2}$

(f) $2\frac{2}{3}$, $2\frac{3}{7}$

3. Write $>$ or $<$ or $=$ in each \bigcirc .

(a) $2\frac{4}{5} \bigcirc \frac{8}{3}$

(b) $\frac{13}{4} \bigcirc \frac{15}{7}$

(c) $4 \bigcirc \frac{24}{6}$

(d) $\frac{5}{9} \bigcirc \frac{7}{12}$

4. Arrange the fractions in increasing order.

(a) $\frac{11}{8}, \frac{6}{7}, \frac{3}{5}, 1\frac{1}{6}$

(b) $\frac{2}{3}, \frac{1}{2}, \frac{16}{9}, 2\frac{4}{5}$

5. Arrange the fractions in decreasing order.

(a) $\frac{5}{12}, \frac{1}{10}, \frac{2}{5}, \frac{13}{6}$

(b) $\frac{5}{4}, \frac{3}{2}, 2\frac{1}{9}, \frac{19}{3}$

Exercise 2 : Fraction and Division

1. Express each of the following as a mixed number in its simplest form.

(a) $16 \div 3$ =	(b) $23 \div 4$ =
(c) $37 \div 5$ =	(d) $19 \div 6$ =
(e) $7 \div 2$ =	(f) $25 \div 7$ =
(g) $15 \div 10$ =	(h) $13 \div 8$ =

2. Express each of the following as a whole number or a mixed number in its simplest form.

(a) $\frac{15}{4} =$	(b) $\frac{27}{8} =$
(c) $\frac{48}{6} =$	(d) $\frac{35}{10} =$
(e) $\frac{38}{7} =$	(f) $\frac{51}{3} =$
(g) $\frac{7}{2} =$	(h) $\frac{99}{5} =$
(i) $\frac{11}{9} =$	(j) $\frac{56}{8} =$

3. Do these. Show all your work clearly.

- (a) There were 30 cookies in a jar. Eileen divided the cookies into 12 equal shares. How many cookies were there in each share? Give your answer as a mixed number.

- (b) A gallon of milk was poured equally into 9 glasses. How many cups of milk are there in each glass? Give your answer as a mixed number.

1 gal = 16 cups



(c) Ryan cut a wire, 1 m long, into 10 equal pieces. How long was each piece of wire in meters?

(d) A jug can hold 3 times as much juice as a mug. If the jug can hold 2 liters of juice, how much juice in liters can the mug hold?

Exercise 3 : Addition and Subtraction of Unlike Fractions

1. Add. Give each answer in its simplest form.

(a) $\frac{2}{3} + \frac{5}{9} =$

(b) $\frac{4}{5} + \frac{2}{3} =$

(c) $\frac{1}{2} + \frac{4}{5} =$

(d) $\frac{5}{6} + \frac{13}{18} =$

(e) $\frac{7}{10} + \frac{3}{4} =$

(f) $1\frac{7}{8} + \frac{1}{2} =$

(g) $3\frac{1}{6} + \frac{3}{4} =$

(h) $2\frac{5}{6} + \frac{1}{5} =$

(i) $2\frac{2}{5} + \frac{3}{4} =$

(j) $3\frac{5}{6} + \frac{3}{10} =$

mug. If the
juice in liters

2. Subtract. Give each answer in its simplest form.

(a) $\frac{3}{4} - \frac{3}{8} =$	(b) $\frac{11}{12} - \frac{3}{4} =$
(c) $\frac{2}{3} - \frac{5}{12} =$	(d) $1\frac{7}{12} - \frac{3}{4} =$
(e) $1\frac{1}{2} - \frac{9}{10} =$	(f) $2\frac{1}{8} - \frac{1}{2} =$
(g) $\frac{3}{4} - \frac{1}{3} =$	(h) $\frac{5}{6} - \frac{1}{4} =$
(i) $\frac{9}{10} - \frac{5}{6} =$	(j) $1\frac{3}{10} - \frac{3}{4} =$
(k) $2\frac{1}{3} - \frac{4}{5} =$	(l) $3\frac{5}{8} - \frac{9}{10} =$

Exercise 4 : Addition and Subtraction of Mixed Numbers

1. Add. Give each answer in its simplest form.

(a) $3\frac{5}{8} + 2\frac{1}{4} =$	(b) $1\frac{1}{3} + 2\frac{5}{12} =$
(c) $2\frac{3}{4} + 1\frac{7}{12} =$	(d) $1\frac{5}{6} + 2\frac{3}{10} =$
(e) $2\frac{2}{3} + 2\frac{1}{2} =$	(f) $1\frac{3}{4} + 3\frac{4}{5} =$
(g) $3\frac{3}{4} + 1\frac{5}{6} =$	(h) $2\frac{5}{8} + 1\frac{5}{6} =$

2. Subtract. Give each answer in its simplest form.

(a) $5\frac{7}{12} - 2\frac{1}{3} =$

(b) $5\frac{1}{3} - 2\frac{5}{6} =$

(c) $3\frac{2}{3} - 1\frac{13}{15} =$

(d) $4\frac{1}{4} - 3\frac{7}{12} =$

(e) $3\frac{1}{2} - 1\frac{3}{5} =$

(f) $3\frac{1}{4} - 1\frac{5}{6} =$

(g) $5\frac{4}{9} - 3\frac{5}{6} =$

(h) $4\frac{5}{8} - 1\frac{11}{12} =$

3. Do these. Show all your work clearly.

(a) The total length of two strings is $3\frac{3}{5}$ m. If one string is $1\frac{7}{10}$ m long, what is the length of the other string?

(b) A clerk works $3\frac{5}{6}$ h in the morning and $3\frac{4}{5}$ h in the afternoon. How many hours does she work in a day?

- (c) A papaya weighs $2\frac{1}{8}$ kg. A guava weighs $1\frac{3}{4}$ kg less.
Find the total weight of the two fruits.

- (d) A shopkeeper had 9 lb of beef jerky. He sold $2\frac{3}{4}$ lb on Friday and $3\frac{3}{5}$ lb on Saturday. How many pounds of beef jerky did he have left?

Exercise 5 : Multiplying a Fraction and a Whole Number

1. Find the value of each of the following.

(a) $8 \times \frac{1}{2} =$	(b) $\frac{2}{11} \times 33 =$
(c) $\frac{3}{7} \times 28 =$	(d) $45 \times \frac{4}{5} =$
(e) $\frac{3}{4} \times 2 =$	(f) $\frac{9}{10} \times 15 =$
(g) $27 \times \frac{5}{6} =$	(h) $30 \times \frac{5}{9} =$
(i) $\frac{3}{8} \times 14 =$	(j) $\frac{2}{3} \times 44 =$

2. Do these. Show all your work clearly.

(a) Natalie needs $\frac{1}{2}$ a cup of flour to bake a pie.

How many cups of flour does she need to bake 5 pies?

(b) Joshua jogs $\frac{1}{4}$ km every day. What is the total distance, in kilometers, Joshua jogs in a week?

Exercise 6 : Fraction of a set

1. Find the value of each of the following.

(a) $\frac{3}{4}$ of 12	(b) $\frac{2}{5}$ of 75
(c) $\frac{1}{6}$ of 8	(d) $\frac{4}{9}$ of 24
(e) $\frac{3}{8}$ of 21	(f) $\frac{5}{7}$ of 32

2. Find the equivalent measures.

(a) $\frac{3}{5}$ km = _____ m

(b) $\frac{4}{15}$ h = _____ min

(c) $\frac{3}{10}$ m = _____ cm

(d) $\frac{1}{6}$ day = _____ h

(e) $4\frac{5}{8}$ lb = _____ oz

(f) $2\frac{5}{12}$ years = _____ months

(g) $1\frac{1}{2}$ ℓ = _____ ml

(h) $5\frac{7}{12}$ min = _____ s

(i) $1\frac{2}{5}$ h = _____ min

(j) $7\frac{1}{4}$ gal = _____ c

3. Write each of the following in compound units.

(a) $2\frac{1}{4}$ kg = _____ kg _____ g

(b) $3\frac{2}{3}$ years = _____ years _____ months

(c) $8\frac{3}{10}$ min = _____ min _____ s

(d) $6\frac{3}{4}$ ft = _____ ft _____ in.

(e) $4\frac{3}{5}$ km = _____ km _____ m

(f) $5\frac{7}{10}$ m = _____ m _____ cm

(g) $7\frac{5}{6}$ days = _____ days _____ h

(h) $8\frac{2}{15}$ h = _____ h _____ min

(i) $5\frac{1}{20}$ kg = _____ kg _____ g

(j) $10\frac{9}{10}$ m = _____ m _____ cm

(k) $6\frac{1}{5}$ l = _____ l _____ ml

(l) $3\frac{5}{12}$ ft = _____ ft _____ in.

(m) $9\frac{1}{3}$ h = _____ h _____ min

(n) $12\frac{3}{7}$ weeks = _____ weeks _____ days

4. Solve.

(a) Express 350 g as a fraction of 1 kg.

(b) Express 60 cm as a fraction of 1 m.

(c) Express 55 cents as a fraction of \$2.00.

(d) What fraction of 6 h is 30 min?

(e) What fraction of 1 ℓ is 250 ml?

Exercise 7 : Word Problems

1. Do these. Show all your work clearly.

(a) Tony took $\frac{7}{10}$ of an hour to finish his exercise. How many minutes did he take?

(b) Ashton bought 20 apples. He ate 5 of them. What fraction of the apples did he eat? What fraction of the apples did he have left?

(c) Emily bought 15 stamps. She gave $\frac{2}{3}$ of them to Maggie. How many stamps did she have left?

(d) Larry jogged $2\frac{3}{5}$ km. How many kilometers and meters did he jog?

ft?

(e) Elise had \$15. She spent $\frac{4}{5}$ of it on a book. How much money did she have left?

meters

(f) $\frac{2}{5}$ of the washing machines in a store were sold for \$3840. If 18 washing machines remained in the store, what was the cost of each washing machine sold?

- (g) There are 200 first grade students in Pine Elementary School. The number of second grade students is $\frac{4}{5}$ that of first grade students. The total number of first and second grade students is $\frac{3}{8}$ of the total school population. What is the total school population?

Unit 4 : Multiply and Divide Fractions

Friendly Notes

Product of Fractions

When multiplying a fraction by another fraction, we multiply the numerators and the denominators separately.

1. Multiply $\frac{2}{3}$ by $\frac{7}{10}$.

Method 1:

$$\begin{aligned}\frac{2}{3} \times \frac{7}{10} &= \frac{2 \times 7}{3 \times 10} \\ &= \frac{7}{15}\end{aligned}$$

Method 2:

$$\frac{2}{3} \times \frac{7}{10} = \frac{7}{15}$$

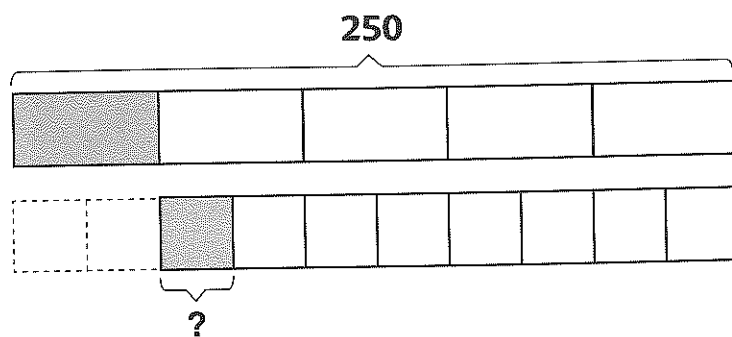
2. $\frac{3}{4}$ of a class are girls. $\frac{1}{6}$ of the girls have long hair. What fraction of the class are girls with long hair?

$$\begin{aligned}\frac{1}{6} \times \frac{3}{4} &= \frac{3}{24} \\ &= \frac{1}{8}\end{aligned}$$

$\frac{1}{8}$ of the class are girls with long hair.

Word Problems

A storybook has 250 pages. Melissa read $\frac{1}{5}$ of the storybook on Friday and $\frac{1}{8}$ of the remaining pages on Saturday. How many pages did she read on Saturday?



Method 1:

$$1 - \frac{1}{5} = \frac{4}{5}$$

She had $\frac{4}{5}$ of the pages in the storybook left to read on Friday.

$$\frac{1}{8} \times \frac{4}{5} = \frac{1}{10}$$

She read $\frac{1}{10}$ of the pages in the storybook on Saturday.

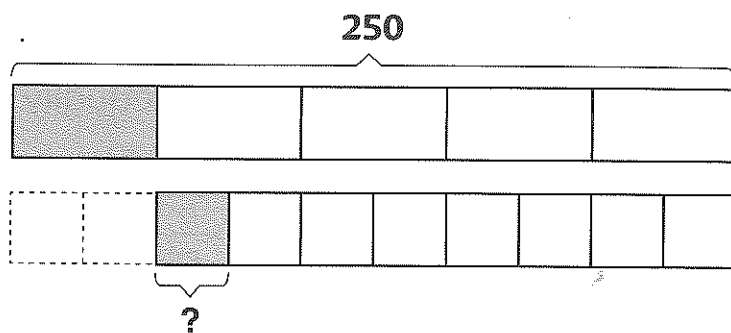
$$\frac{1}{10} \times 250 = 25$$

She read 25 pages on Saturday.

the storybook on
How many

Method 2:

$$1 - \frac{1}{5} = \frac{4}{5}$$



She had $\frac{4}{5}$ of the pages in the storybook left to read on Friday.

$$\frac{4}{5} \times 250 = 200$$

She had 200 pages left on Friday.

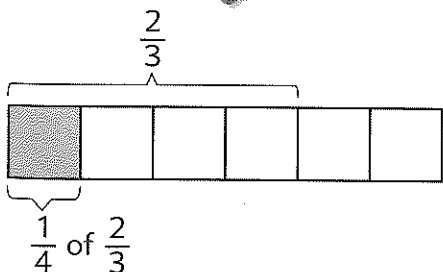
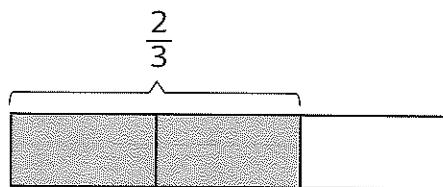
$$\frac{1}{8} \times 200 = 25$$

She read 25 pages on Saturday.

ad on Friday.

Dividing a Fraction by a Whole Number

1. Divide $\frac{2}{3}$ by 4.



Divide $\frac{2}{3}$ into 4 equal parts.
Each part is $\frac{1}{4}$ of $\frac{2}{3}$.



$$\begin{aligned} \frac{2}{3} \div 4 &= \frac{2}{3} \times \frac{1}{4} \\ &= \frac{2}{12} \\ &= \frac{1}{6} \end{aligned}$$

2. 3 children shared $\frac{3}{5}$ of a pie equally. How much pie did each of them get?

$$\begin{aligned}\frac{3}{5} \div 3 &= \frac{3}{5} \times \frac{1}{3} \\ &= \frac{3}{15} \\ &= \frac{1}{5}\end{aligned}$$

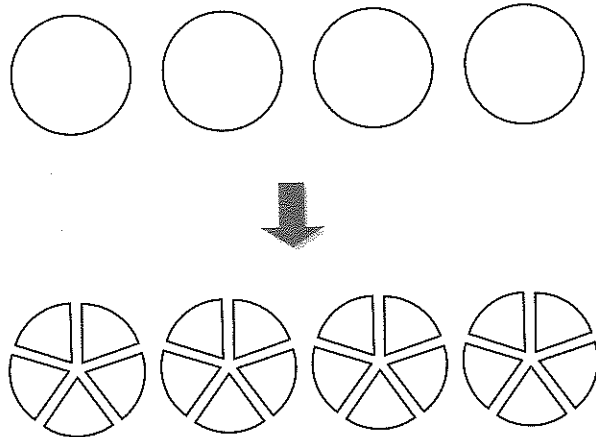
Dividing by 3 is the same as multiplying by $\frac{1}{3}$.



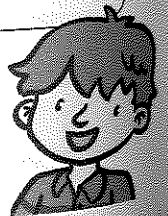
Each of them got $\frac{1}{5}$ of the pie.

Dividing by a Fraction

1. Rita bought 4 pies. She cut each pie into fifths. How many pieces of pie did she have?



There are 5 fifths in 1 whole.
There are 20 fifths in 4 wholes.



did each

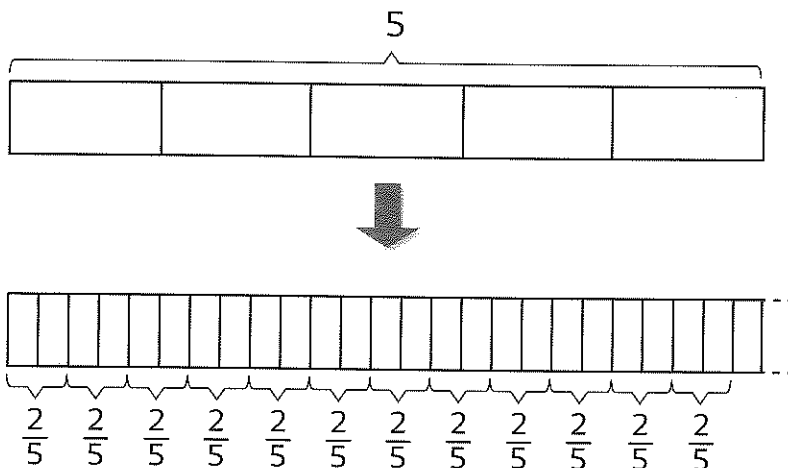
$$4 \div \frac{1}{5} = 4 \times 5$$
$$= 20$$

Dividing by $\frac{1}{5}$ is the same
as multiplying by 5.

5 is the **reciprocal** of $\frac{1}{5}$.

She had 20 pieces of pie.

2. Divide 5 by $\frac{2}{5}$.

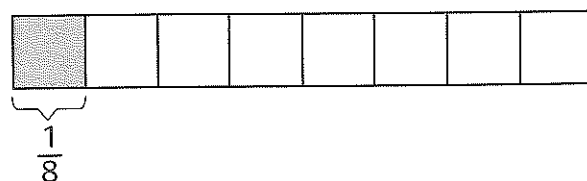
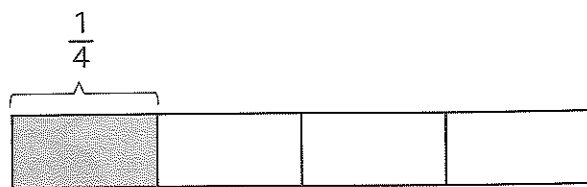


$$5 \div \frac{2}{5} = 5 \times \frac{5}{2}$$
$$= \frac{25}{2}$$
$$= 12\frac{1}{2}$$

Dividing by $\frac{2}{5}$ is the same
as multiplying by $\frac{5}{2}$.

5 fifths
= 20
wholes.

3. Divide $\frac{1}{4}$ by $\frac{1}{8}$.



$$\begin{aligned}\frac{1}{4} \div \frac{1}{8} &= \frac{1}{4} \times 8 \\ &= \frac{8}{4} \\ &= 2\end{aligned}$$

Divide $\frac{1}{4}$ into eighths.
There are 2 eighths.
8 is the reciprocal of $\frac{1}{8}$.



Dividing by $\frac{1}{8}$ is the
same as multiplying by 8.



Exercise 1: Product of Fractions

1. Multiply.

$$(a) \frac{3}{8} \times \frac{2}{9} =$$

$$(b) \frac{1}{6} \times \frac{1}{3} =$$

$$(c) \frac{5}{9} \times \frac{9}{10} =$$

$$(d) \frac{7}{9} \times \frac{3}{14} =$$

$$(e) \frac{6}{7} \times \frac{2}{5} =$$

$$(f) \frac{14}{15} \times \frac{10}{21} =$$

$$(g) \frac{5}{6} \times \frac{6}{13} =$$

$$(h) \frac{15}{26} \times \frac{22}{25} =$$

$$(i) \frac{4}{7} \times \frac{2}{3} =$$

$$(j) \frac{9}{14} \times \frac{8}{15} =$$

to eighths.
eighths.
reciprocal of $\frac{1}{8}$.



(k) $\frac{1}{4} \times \frac{1}{3} =$	(l) $\frac{3}{5} \times \frac{2}{6} =$
(m) $\frac{4}{11} \times \frac{1}{2} =$	(n) $\frac{5}{8} \times \frac{1}{3} =$
(o) $\frac{8}{13} \times \frac{7}{12} =$	(p) $\frac{5}{16} \times \frac{8}{25} =$

2. Find the value of each of the following.

(a) $\frac{1}{2}$ of $\frac{4}{5}$

(b) $\frac{3}{4}$ of $\frac{6}{7}$

Exercise 2 : Word Problems

1. Do these. Show your work clearly.

(a) Jane had $\frac{3}{5}$ kg of sugar. She gave $\frac{1}{3}$ of it to Kathy.

How much sugar did she give to Kathy? Give your answer in kg.

(b) I read $\frac{1}{4}$ of a book on Saturday and $\frac{2}{5}$ of the remainder on Sunday. If 36 pages still remain to be read, how many pages are there in this book altogether?

(c) May has 84 books. $\frac{3}{4}$ of them are fiction books. $\frac{2}{3}$ of the fiction books are on science fiction. How many science fiction books are there?

(d) Tyrone has 320 storybooks. He bought $\frac{5}{8}$ of the books himself. The number of books his uncle gave him is $\frac{2}{5}$ of the number of books he bought. How many storybooks did his uncle give him?

Exercise 3 : Dividing a Fraction by a Whole Number

1. Divide.

(a) $\frac{1}{2} \div 2 =$

(b) $\frac{2}{3} \div 5 =$

(c) $\frac{7}{8} \div 14 =$

(d) $\frac{3}{10} \div 3 =$

(e) $\frac{5}{6} \div 10 =$

(f) $\frac{4}{7} \div 8 =$

(g) $\frac{3}{4} \div 12 =$

(h) $\frac{2}{5} \div 7 =$

(i) $\frac{5}{7} \div 10 =$

(j) $\frac{3}{8} \div 6 =$

$$(k) \frac{4}{5} \div 3 =$$

$$(l) \frac{2}{3} \div 6 =$$

$$(m) \frac{3}{8} \div 3 =$$

$$(n) \frac{11}{5} \div 3 =$$

$$(o) \frac{5}{12} \div 10 =$$

$$(p) \frac{3}{8} \div 2 =$$

$$(q) \frac{6}{5} \div 18 =$$

$$(r) \frac{7}{10} \div 3 =$$

$$(s) \frac{3}{4} \div 9 =$$

$$(t) \frac{3}{5} \div 6 =$$

Exercise 4 : Dividing by a Fraction

1. Divide. Write all answers in their simplest form. Change answers to whole or mixed numbers where possible.

(a) $8 \div \frac{3}{2} =$

(b) $5 \div \frac{15}{16} =$

(c) $2 \div \frac{3}{10} =$

(d) $6 \div \frac{3}{4} =$

(e) $10 \div \frac{5}{8} =$

(f) $20 \div \frac{25}{24} =$

(g) $9 \div \frac{3}{5} =$

(h) $7 \div \frac{1}{3} =$

$$(i) \quad \frac{3}{4} \div \frac{5}{8} =$$

$$(j) \quad \frac{3}{4} \div \frac{5}{3} =$$

$$(k) \quad \frac{4}{5} \div \frac{9}{4} =$$

$$(l) \quad \frac{7}{9} \div \frac{7}{36} =$$

$$(m) \quad \frac{15}{32} \div \frac{5}{64} =$$

$$(n) \quad \frac{36}{35} \div \frac{15}{14} =$$

$$(o) \quad \frac{7}{8} \div \frac{1}{3} =$$

$$(p) \quad \frac{7}{9} \div \frac{1}{7} =$$

Exercise 5 : More Word Problems

1. Do these. Show your work clearly.

(a) The area of a rectangular piece of paper is $\frac{4}{9} \text{ m}^2$.

Its width is 4 m. What is its length in meters?

(b) $\frac{6}{7}$ liters of orange juice was shared equally among 3 students. How much orange juice did each student get? Give your answer in liters.

- (c) Sam divided $\frac{5}{8}$ lb of strawberries among 5 friends.
How many pounds of strawberries did each friend receive?

- (d) Eric had 28 kg of soy beans. He gave $3\frac{1}{5}$ kg to his wife and packed the rest equally into bags. If each bag contained $\frac{4}{5}$ kg of soy beans, how many bags could he pack?

(e) Muthu reads 20 pages of a book in a day. After 6 days, $\frac{2}{5}$ of the book is still unread. How many pages are there in this book?

(f) After $\frac{1}{6}$ of a barrel of rice was eaten, 10 kg of the rice was left. How many kg of rice would be left after $\frac{1}{4}$ of it had been eaten?

(g) Andy has $7\frac{3}{4}$ qt of fruit juice more than Molly. Molly has $3\frac{1}{2}$ qt of fruit juice less than Sami. Sami has $13\frac{2}{3}$ qt of fruit juice. How much fruit juice do Andy and Molly have altogether?

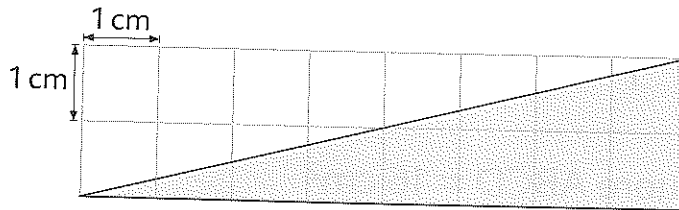
(h) Jim gave $\frac{3}{8}$ of his stickers to Leroy and $\frac{1}{4}$ of them to Rani. He had 21 stickers left. How many stickers did he have at first?

Unit 5 : Perimeter, Area and Surface Area

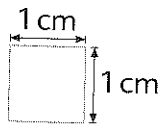
Friendly Notes


Square Units

1. Find the area of the shaded figure.



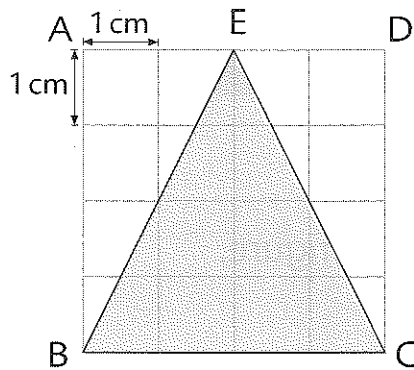
The area of each
is 1 cm^2 .



The shaded figure
covers 8 .

The area of the shaded figure is 8 cm^2 .

2. Find the area of the shaded triangle.



Area of square ABCD = 16 cm^2

Triangle ABE covers 4 ☐.

Triangle EDC covers 4 ☐.



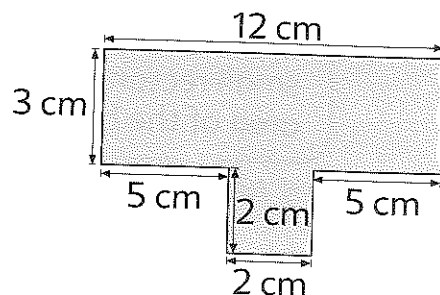
Area of triangle ABE = 4 cm^2

Area of triangle EDC = 4 cm^2

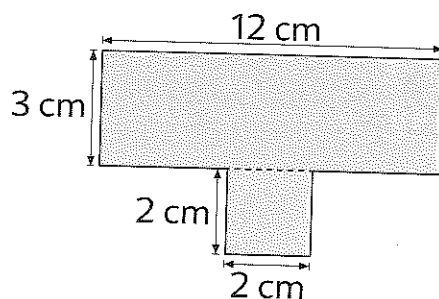
\therefore Area of the shaded triangle = $16 - 4 - 4$
 $= 8 \text{ cm}^2$

Rectangles and Squares

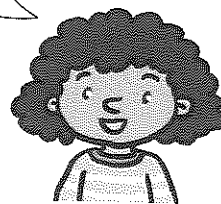
Find the area and perimeter of the figure.



Method 1:



I find the total area of a rectangle and a square.

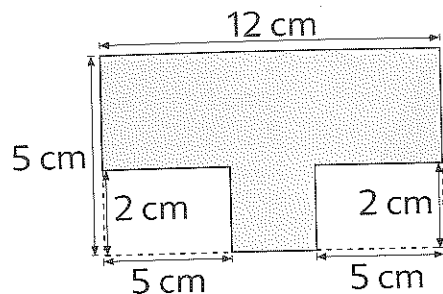


$$\begin{aligned}\text{Area of rectangle} &= 12 \times 3 \\ &= 36 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of square} &= 2 \times 2 \\ &= 4 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of figure} &= 36 + 4 \\ &= 40 \text{ cm}^2\end{aligned}$$

Method 2:



I subtract the area of the 2 small rectangles from the area of the big rectangle.



$$\begin{aligned}\text{Area of 2 small rectangles} &= 2 \times 5 \times 2 \\ &= 2 \times 10 \\ &= 20 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of big rectangle} &= 12 \times 5 \\ &= 60 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of figure} &= 60 - 20 \\ &= 40 \text{ cm}^2\end{aligned}$$

I add the lengths of all the sides of the figure to find the perimeter.



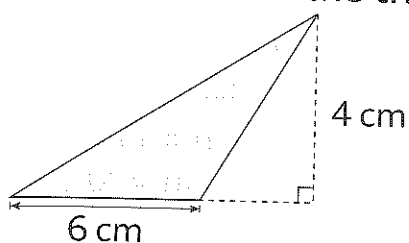
$$\begin{aligned}\text{Perimeter of the figure} &= 12 + 3 + 5 + 2 + 2 + 2 + 5 + 3 \\ &= 34 \text{ cm}\end{aligned}$$

Area of a Triangle

Area of a triangle = $\frac{1}{2} \times \text{base} \times \text{height}$

The base of a triangle is perpendicular to its height.

1. Find the area of the triangle shown.

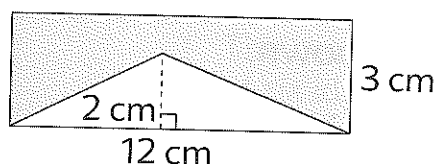


Base of the triangle = 6 cm
Height of the triangle = 4 cm

$$\begin{aligned}\text{Area of the triangle} &= \frac{1}{2} \times 6 \times 4 \\ &= 12 \text{ cm}^2\end{aligned}$$



2. Find the shaded area of the rectangle.



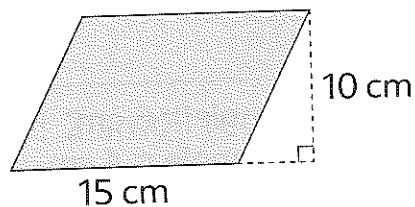
$$\begin{aligned}\text{Shaded area} &= \text{area of rectangle} - \text{area of triangle} \\ &= (12 \times 3) - \left[\frac{1}{2} \times 12 \times 2 \right] \\ &= 36 - 12 \\ &= 24 \text{ cm}^2\end{aligned}$$

Area of a Parallelogram

Area of a parallelogram = base \times height

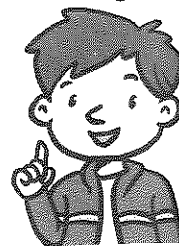
The base of a parallelogram is perpendicular to its height.

1. Find the area of the parallelogram shown.

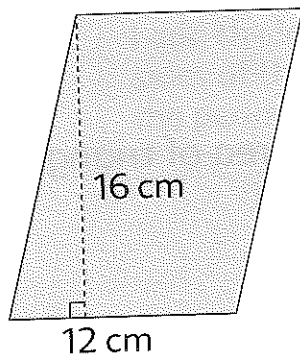


Base of parallelogram = 15 cm
Height of parallelogram = 10 cm

$$\begin{aligned}\text{Area of the parallelogram} &= 15 \times 10 \\ &= 150 \text{ cm}^2\end{aligned}$$

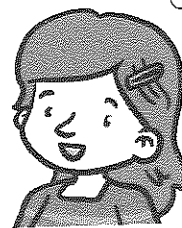


2. Find the area of the parallelogram shown.



Base of parallelogram = 12 cm
Height of parallelogram = 16 cm

$$\begin{aligned}\text{Area of the parallelogram} &= 12 \times 16 \\ &= 192 \text{ cm}^2\end{aligned}$$

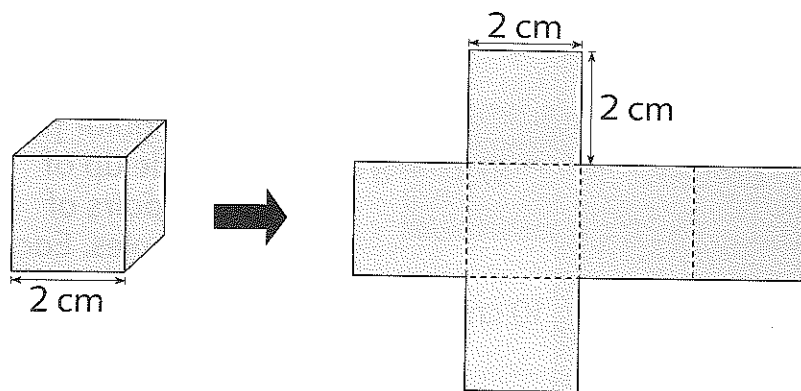


Surface Area

The surface area of a rectangular prism is the sum of the area of all of its faces.

We can use the net of a rectangular prism to find its surface area.

1. Find the surface area of the cube.

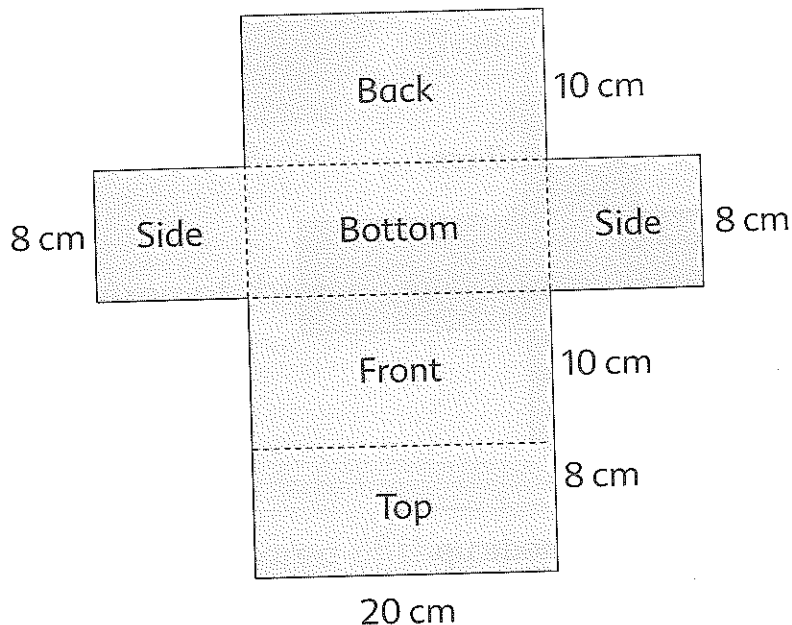
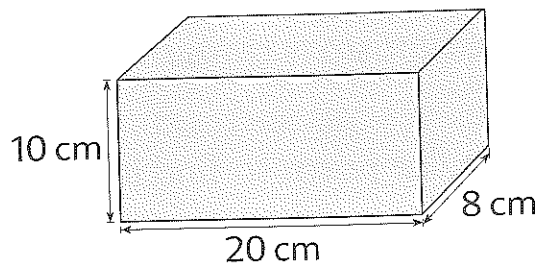


The net of a cube is made up of six identical square faces.
Area of one face = $(2 \times 2) \text{ cm}^2$



$$\begin{aligned}\text{Surface area} &= 6 \times (2 \times 2) \\ &= 6 \times 4 \\ &= 24 \text{ cm}^2\end{aligned}$$

2. Find the surface area of the rectangular prism.



The net of the rectangular prism is made up of three pairs of rectangles. Each pair of rectangles is identical in size.



$$\begin{aligned}\text{Area of top and bottom} &= 2 \times (20 \times 8) \\ &= 320 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of front and back} &= 2 \times (20 \times 10) \\ &= 400 \text{ cm}^2\end{aligned}$$

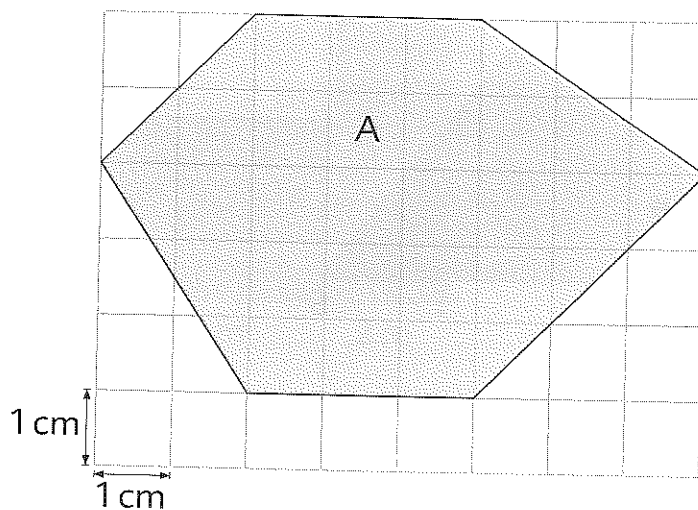
$$\begin{aligned}\text{Area of both sides} &= 2 \times (10 \times 8) \\ &= 160 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Surface area} &= 320 + 400 + 160 \\ &= 880 \text{ cm}^2\end{aligned}$$

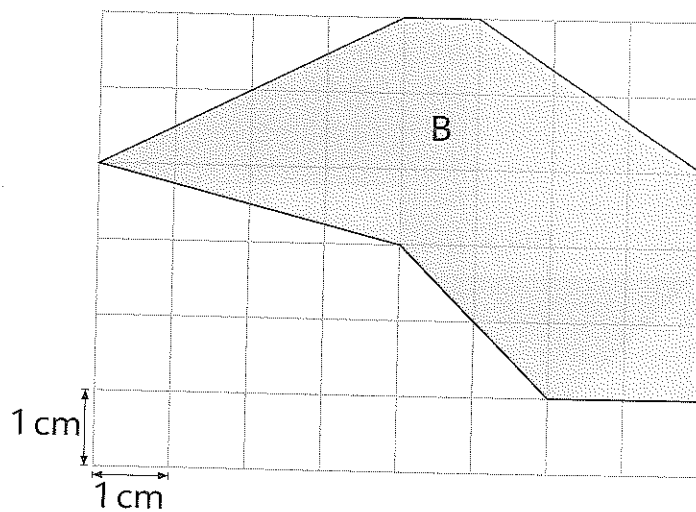
Exercise 1 : Square Units

1. Find the area of each shaded figure.

(a)



(b)

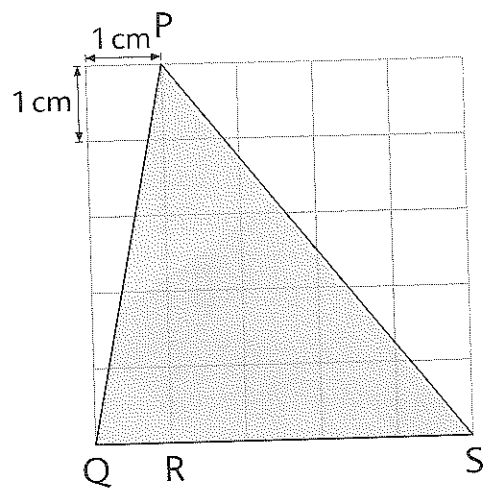


The net of the
tangular prism
made up of
ee pairs of
tangles. Each
r of rectangles is
ntical in size.

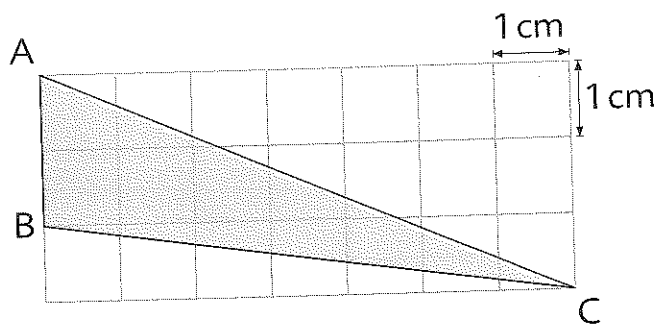


2. Find the area of each shaded triangle.

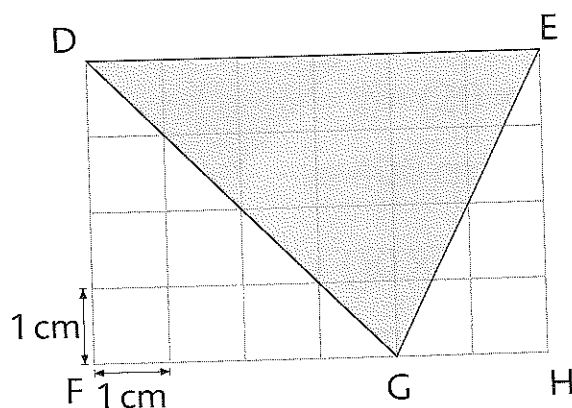
(a)



(b)

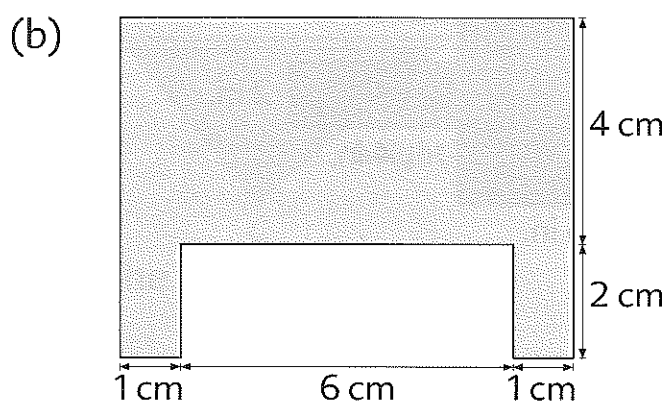
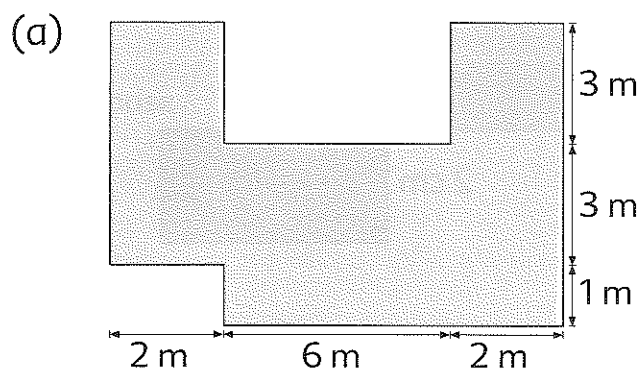


(c)



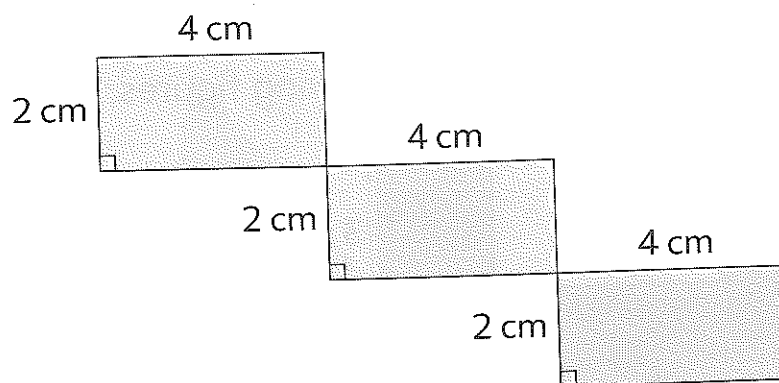
Exercise 2 : Rectangles and Squares

1. Find the area of each of the following figures.

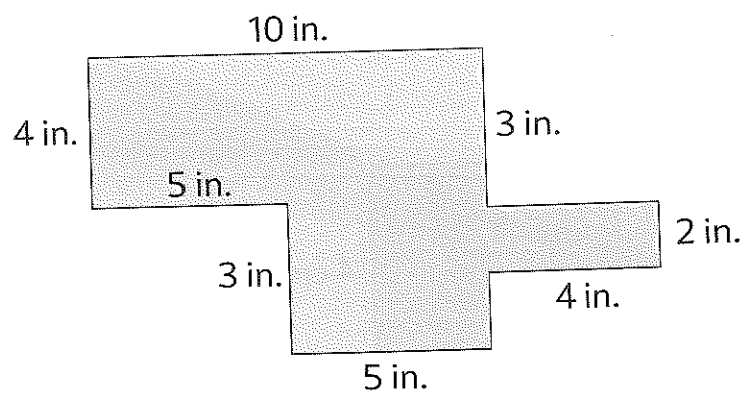


2. Find the perimeter of each of the following figures.

(a)

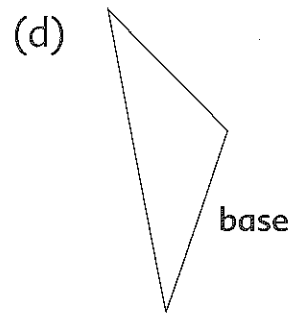
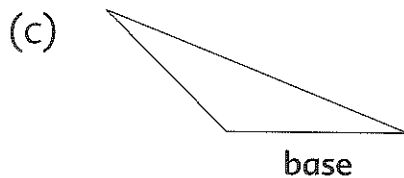
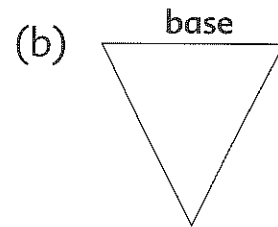
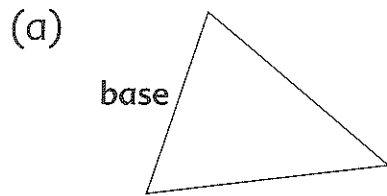


(b)

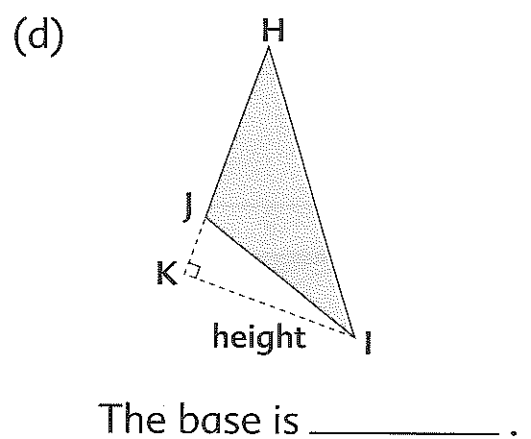
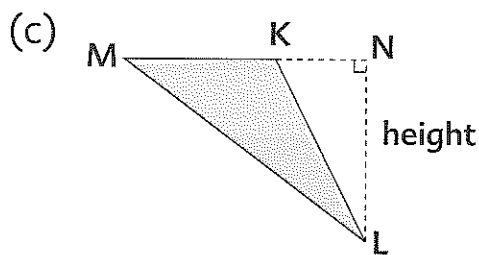
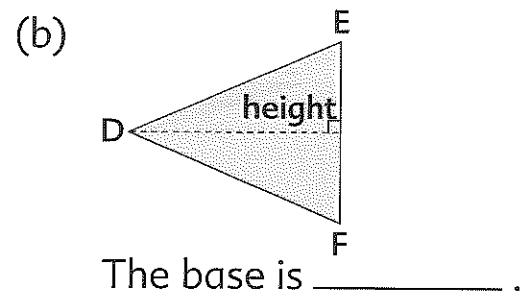
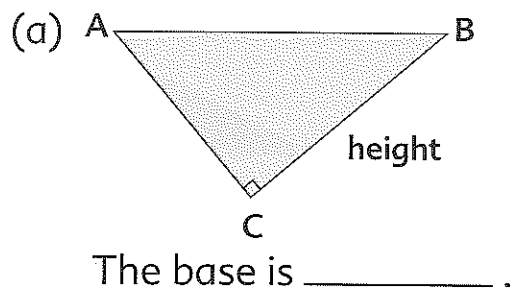


Exercise 3 : Area of a Triangle

1. Draw the height to the given base of each triangle.

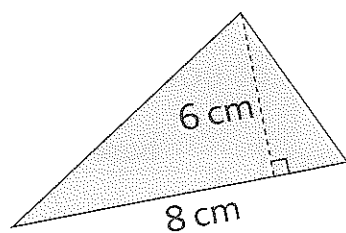


2. Name the base which is related to the given height.

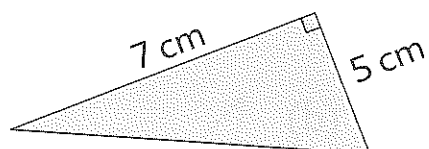


3. Find the area of each triangle.

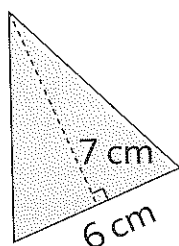
(a)



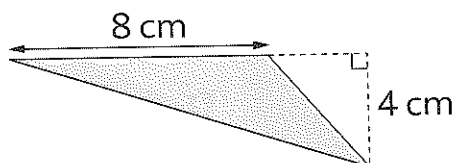
(b)



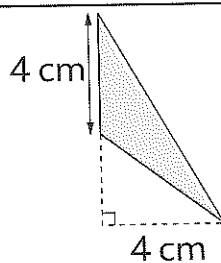
(c)



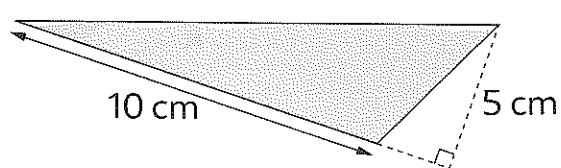
(d)



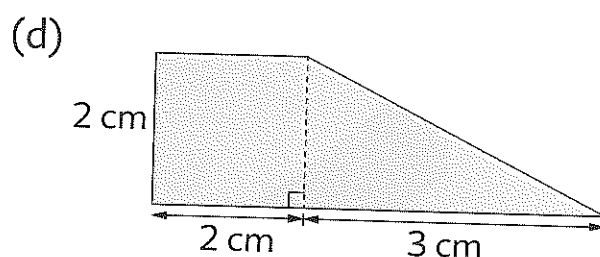
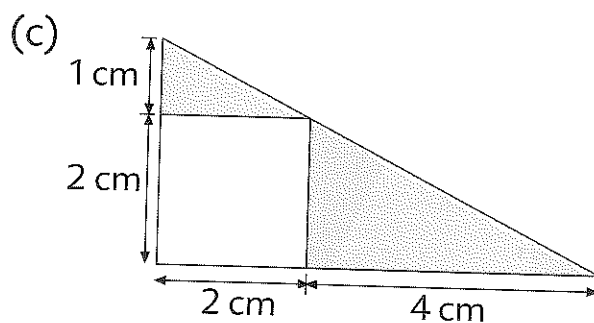
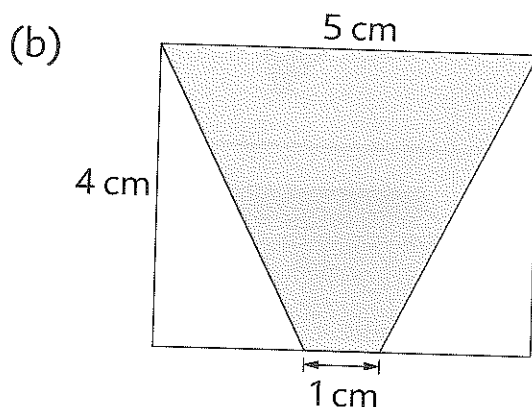
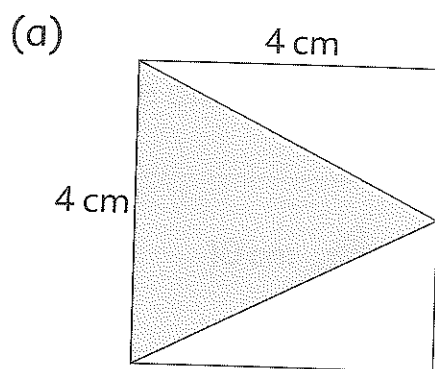
(e)



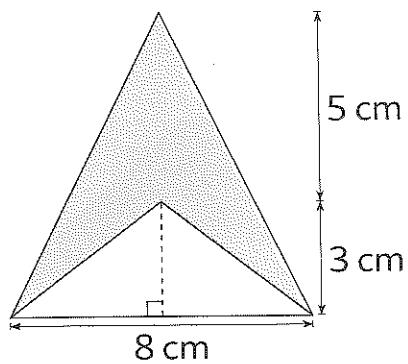
(f)



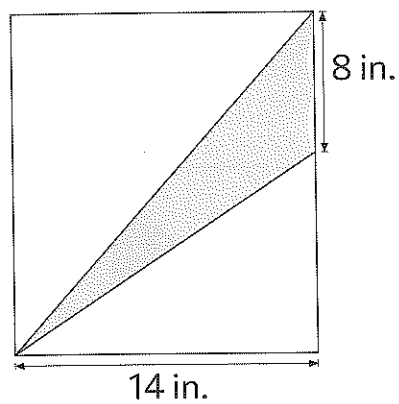
4. Find the area of the shaded portion in each figure.



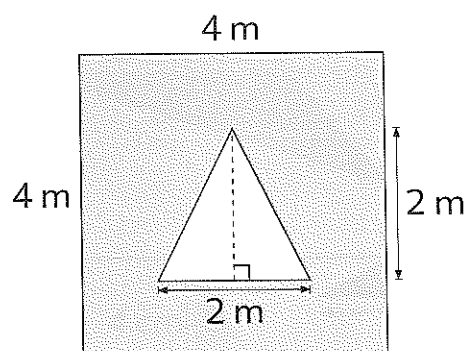
(e)



(f)

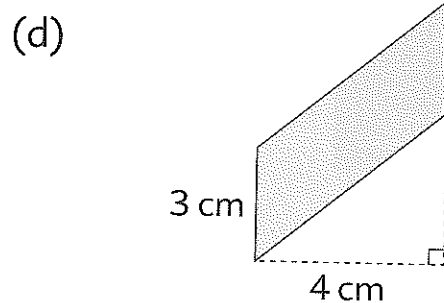
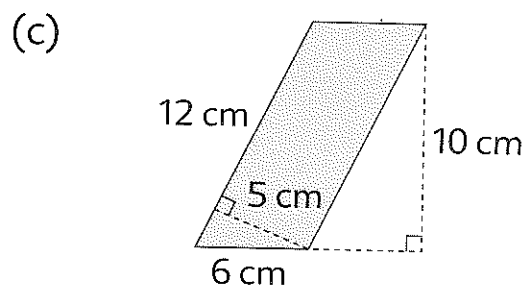
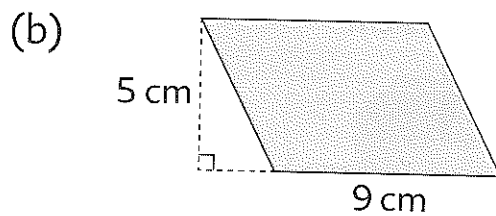
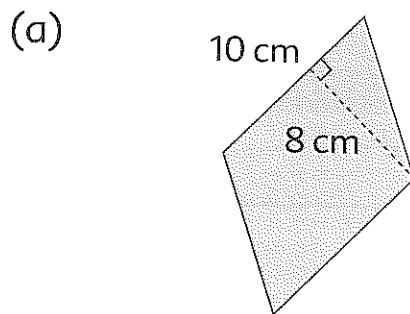


(g)

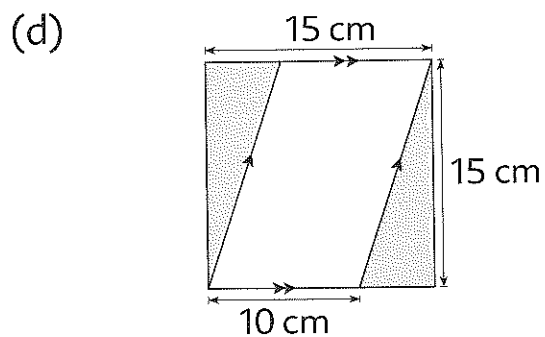
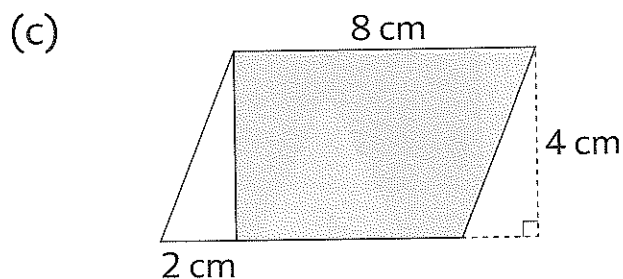
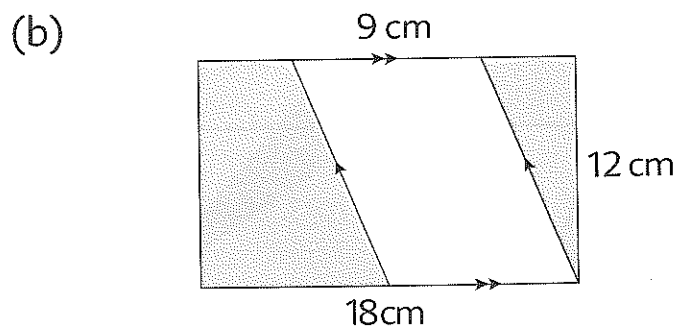
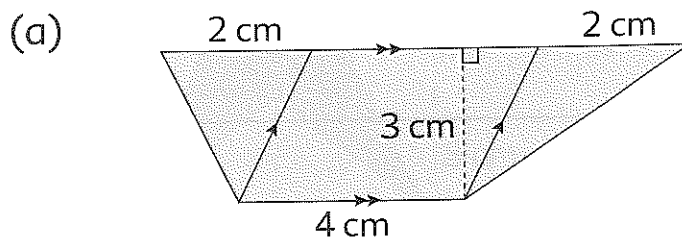


Exercise 4 : Area of a Parallelogram

1. Find the area of each parallelogram.



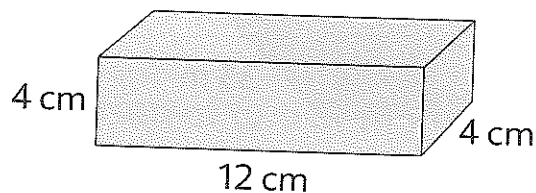
2. Find the area of the shaded portion in each figure.



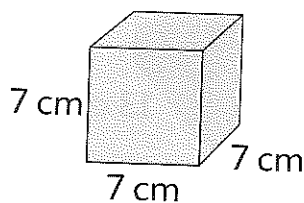
Exercise 5 : Surface Area

1. Find the surface area of each of the following solids.

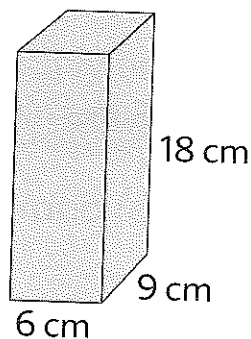
(a)



(b)



(c)



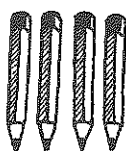
Unit 6 : Ratio

Friendly Notes

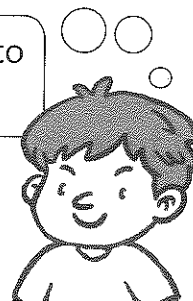
Finding Ratio

Ratio is a comparison of two or more similar quantities.

There are 4 pencils and 3 rulers.



4 pencils to
3 rulers



The ratio of the number of pencils to the number of rulers is 4 : 3.

We read the ratio
4 : 3 as 4 to 3.



Equivalent Ratios

Ratio has no units.

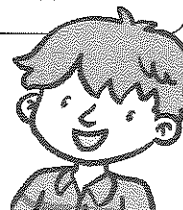
When we divide or multiply both quantities in a ratio by the same number, we obtain equivalent ratios.

1. Find an equivalent ratio for 4 : 6.

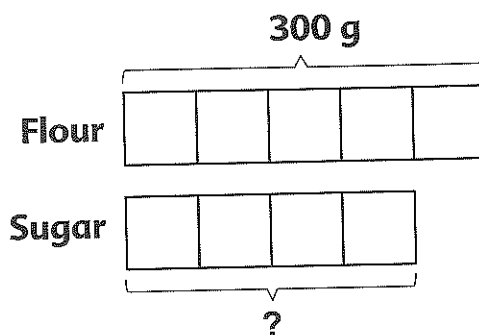
$$\begin{array}{ccc} 4 & : & 6 \\ \div 2 \downarrow & & \downarrow \div 2 \\ 2 & : & 3 \end{array}$$

2 : 3 is an equivalent ratio for 4 : 6.

2 : 3 is the simplest
form of 4 : 6.



2. The ratio of flour to sugar used to make a pie is 5 : 4. If the weight of flour used is 300 g, find the weight of sugar used in making the pie.



$$5 \text{ units} = 300 \text{ g}$$

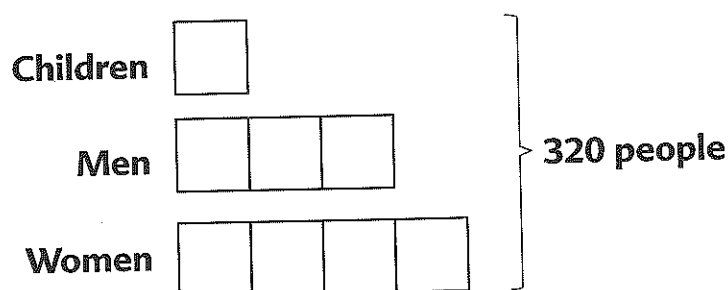
$$1 \text{ unit} = 60 \text{ g}$$

$$4 \text{ units} = 240 \text{ g}$$

The weight of sugar used is 240 g.

Combining Three Quantities

The number of children to the number of men to the number of women at a concert is 1 : 3 : 4. If there were 320 people altogether at the concert, find the number of men at the concert.



$$8 \text{ units} = 320$$

$$1 \text{ unit} = 40$$

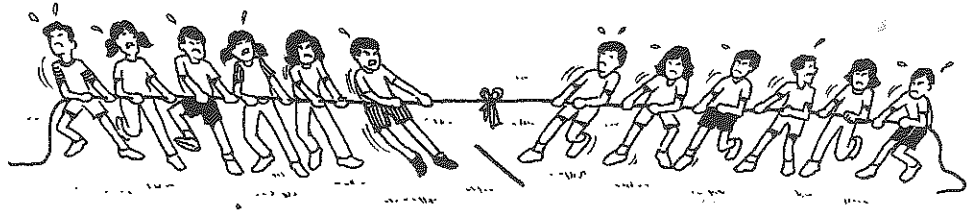
$$3 \text{ units} = 120$$

There were 120 men at the concert.

Exercise 1 : Finding Ratio

1. Fill in the blanks.

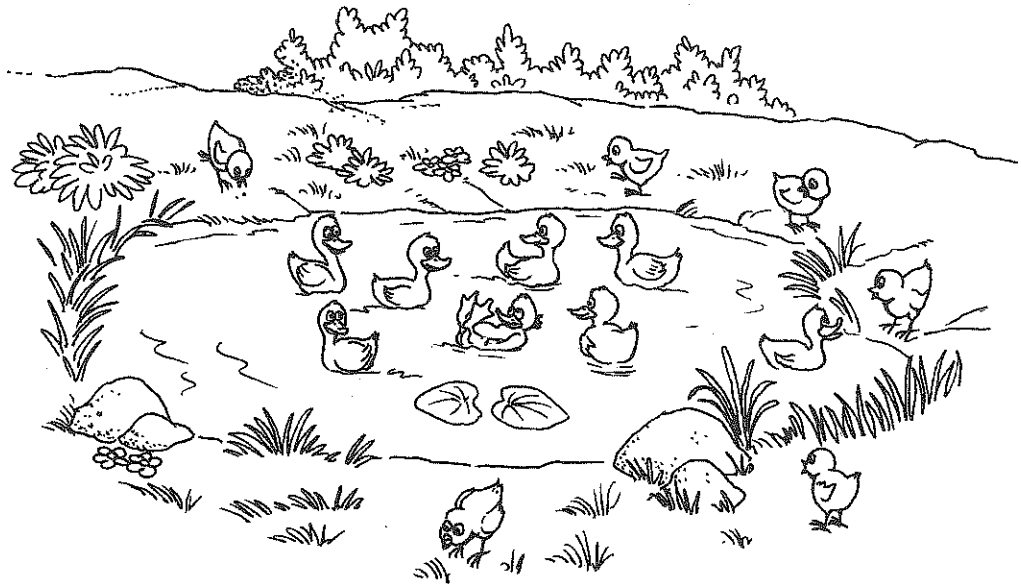
(a)



The ratio of the number of boys to the number of girls is _____ : _____.

The ratio of the number of girls to the number of boys is _____ : _____.

(b)



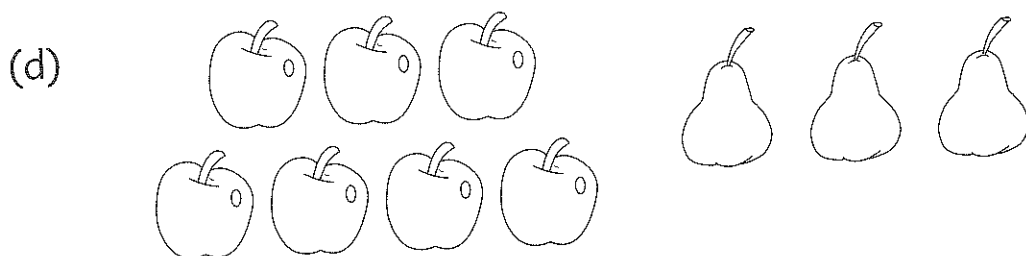
The ratio of the number of chicks to the number of ducklings is _____ : _____.

The ratio of the number of ducklings to the number of chicks is _____ : _____.



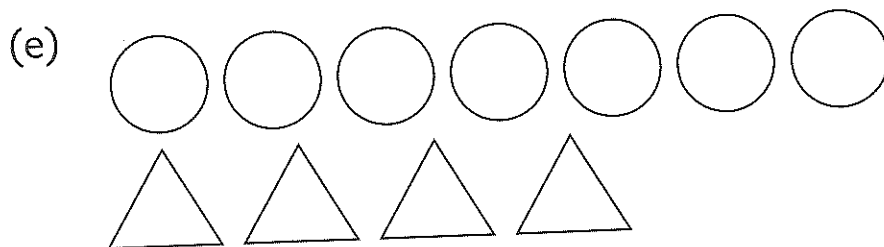
The ratio of the number of ticks to the number of crosses is _____ : _____.

The ratio of the number of crosses to the number of ticks is _____ : _____.



The ratio of the number of apples to the number of pears is _____ : _____.

The ratio of the number of pears to the number of apples is _____ : _____.



The ratio of the number of triangles to the number of circles is _____ : _____.

The ratio of the number of circles to the number of triangles is _____ : _____.

Exercise 2 : Equivalent Ratios

1. Write each ratio in its simplest form.

(a) $4 : 2 =$

(b) $8 : 14 =$

(c) $14 : 42 =$

(d) $25 : 55 =$

(e) $35 : 30 =$

(f) $22 : 33 =$

(g) $72 : 45 =$

(h) $56 : 28 =$

(i) $36 : 63 =$

(j) $100 : 20 =$

2. Write the missing numbers.

(a) $1 : 3 = 3 : \underline{\hspace{2cm}}$

(b) $2 : 5 = 6 : \underline{\hspace{2cm}}$

(c) $3 : 4 = \underline{\hspace{2cm}} : 20$

(d) $4 : 7 = \underline{\hspace{2cm}} : 49$

(e) $5 : \underline{\hspace{2cm}} = 25 : 30$

(f) $6 : \underline{\hspace{2cm}} = 60 : 10$

(g) $\underline{\hspace{2cm}} : 3 = 32 : 12$

(h) $\underline{\hspace{2cm}} : 9 = 49 : 63$

(i) $4 : \underline{\hspace{2cm}} = 44 : 121$

(j) $3 : 5 = \underline{\hspace{2cm}} : 60$

3. Do these. Show all your work clearly.

- (a) Amber has 15 stamps. Molly has 20 stamps. Find the ratio of the number of Molly's stamps to the number of Amber's stamps. Express your answer in its simplest form.

- (b) I spent 1 h 10 min on drawing and 1 h on singing. Find the ratio of the time taken for singing to the time taken for drawing.

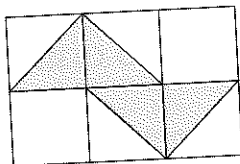
Change 1 h 10 min to min first.



- (c) The sides of two squares are 2 m and 4 m respectively. Find the ratio of the area of the smaller square to that of the bigger square.

- (d) There are 25 adults and 15 children in a bus. What is the ratio of the number of children to the total number of passengers?

- (e) In the figure below, find the ratio of the area of the shaded part to that of the unshaded part.



singing. Find
the time taken

age 1 h 10 min
first.



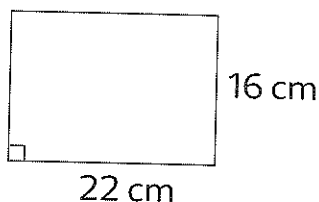
n respectively.
quare to that

us. What is
total number

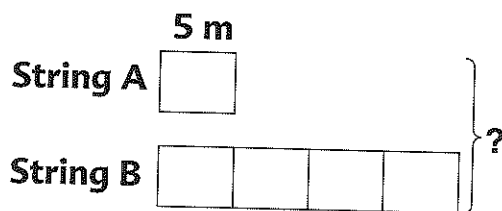
ea of the

- (f) My uncle is 3 times as old as I am. What is the ratio of my age to my uncle's age?

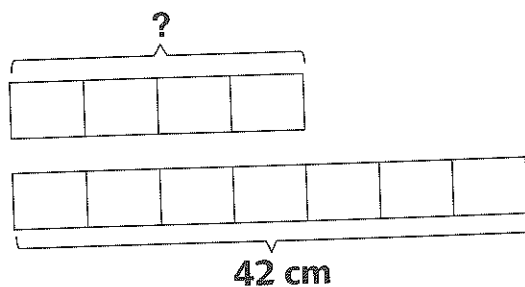
- (g) The length of a rectangular piece of paper is 22 cm. Its width is 16 cm. What is the ratio of its width to its perimeter?



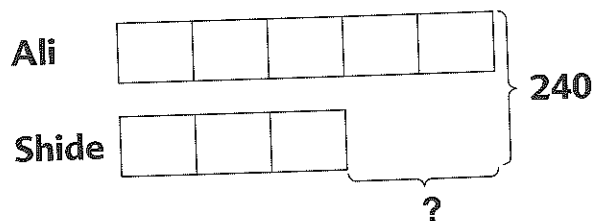
- (h) The ratio of the lengths of two pieces of String A and B is 1 : 4. String A is 5 m long. Find the total length of the two pieces of string.



- (i) A wire was cut into 2 pieces in the ratio 4 : 7. The longer piece was 42 cm. Find the length of the shorter piece.



- (j) 240 rubber bands were shared between Ali and Shide in the ratio 5 : 3. How many fewer rubber bands did Shide receive than Ali?

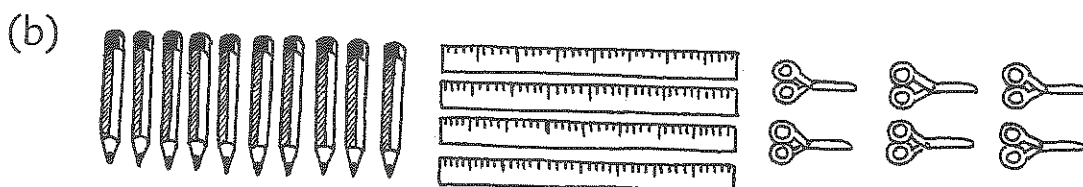


Exercise 3 : Combining Three Quantities

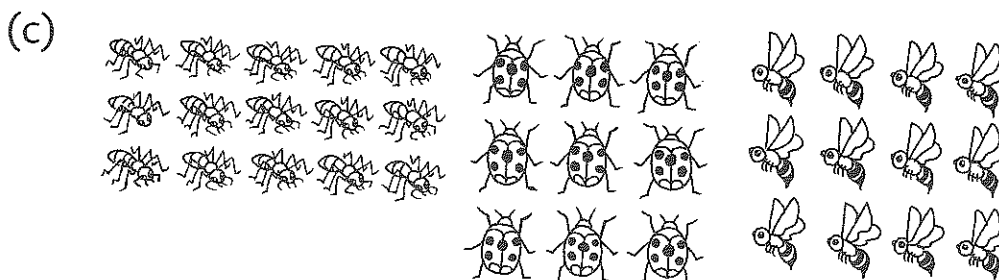
1. Do these. Show all your work clearly.



The ratio of the number of bowls to the number of cups to the number of plates is _____ : _____ : _____ .



The ratio of the number of pencils to the number of rulers to the number of scissors is _____ : _____ : _____ .



The ratio of the number of ants to the number of ladybugs to the number of bees is _____ : _____ : _____ .

- (d) Abel, Barry and Chand donated money to charity in the ratio 3 : 5 : 6. Chand donated \$240 more than Abel. How much did Abel, Barry and Chand donate altogether?

Abel

Barry

Chand

\$240

- (e) Grant split \$11,340 among his three sons from the eldest to the youngest in the ratio 5 : 3 : 7. How much more money did the youngest son receive than the eldest son?

1st son

2nd son

3rd son

\$?

\$11,340

- (f) A right triangle has a perimeter of 90 cm. The lengths of its three sides are in the ratio 5 : 12 : 13. Calculate the length of the longest side of the triangle.

Side A

Side B

Side C

90 cm

Unit 7 : Decimals

Friendly Notes

Tenths, Hundredths and Thousandths

1 one = 10 tenths

1 tenth = 10 hundredths

1 hundredth = 10 thousandths

1. Write 42 tenths as a decimal.

$$\begin{aligned} 42 \text{ tenths} &= 40 \text{ tenths} + 2 \text{ tenths} \\ &= 4 \text{ ones} + 2 \text{ tenths} \\ &= 4 + 0.2 \\ &= 4.2 \end{aligned}$$

2. Find the value of the digit 6 in 2.563.

$$\begin{aligned} 2.563 &= 2 \text{ ones } 5 \text{ tenths } 6 \text{ hundredths } 3 \text{ thousandths} \\ &= 2 + 0.5 + 0.06 + 0.003 \end{aligned}$$

The digit 6 is in the hundredths place.

The value of the digit 6 is 0.06.

2.563 has 3 decimal places. The tenths place, hundredths place and thousandths place are called decimal places.

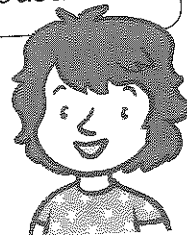


3. What number is 0.001 more than 5.083?

5.083 = 5 ones + 8 hundredths + 3 thousandths

0.001 = 1 thousandth

3 thousandths + 1 thousandth = 4 thousandths



5.084 is 0.001 more than 5.083.

4. Which is smaller, 8.246 or 8.232?

Ones	Tenths	Hundredths	Thousandths
8	2	4	6
8	2	3	2

3 hundredths is smaller than 4 hundredths.
So, 8.232 is smaller.

5. Which is greater, 51.378 or 51.379?

Tens	Ones	Tenths	Hundredths	Thousandths
5	1	3	7	8
5	1	3	7	9

9 thousandths is greater than 8 thousandths.
So, 51.379 is greater.

Approximation

To round a decimal to the nearest whole number, we look at the digit in the first decimal place. If it is 5 or greater, we round up; if it is less than 5, we round down.

1. Round 4.2 m to the nearest meter.

↓
4.2

$$4.2 \text{ m} \approx 4 \text{ m}$$

The digit 2 in the first decimal place is less than 5. So, we round down.



To round a decimal to 1 decimal place, we look at the digit in the second decimal place. If it is 5 or greater, we round up; if it is less than 5, we round down.

2. Round 6.28 to 1 decimal place.

↓
6.28

$$6.28 \approx 6.3$$

The digit 8 in the second decimal place is greater than 5. So, we round up.



3. Round 10.845 to 1 decimal place.

↓
10.845

$$10.845 \approx 10.8$$

The digit 4 in the second decimal place is less than 5. So, we round down.



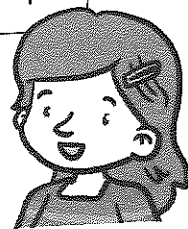
To round a decimal to 2 decimal places, we look at the digit in the third decimal place. If it is 5 or greater, we round up; if it is less than 5, we round down.

4. Round 15.649 to 2 decimal places.

↓
15.649

$$15.649 \approx 15.65$$

The digit 9 in the third decimal place is greater than 5. So, we round up.



5. Round 103.821 to 2 decimal places.

$$103.821 \approx 103.82$$

↓
103.821



Add and Subtract Decimals

1. Add 5.84 and 6.78.

$\begin{array}{r} 5.84 \\ + 6.78 \\ \hline 2 \end{array}$ <p>Add the hundredths.</p>	$\begin{array}{r} 5.84 \\ + 6.78 \\ \hline 62 \end{array}$ <p>Add the tenths.</p>	$\begin{array}{r} 5.84 \\ + 6.78 \\ \hline 12.62 \end{array}$ <p>Add the ones.</p>
--------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------	------------------------------------------------------------------------------------

2. Subtract 4.29 from 7.03.

$\begin{array}{r} 7.03 \\ - 4.29 \\ \hline 4 \end{array}$ <p>Subtract the hundredths.</p>	$\begin{array}{r} 7.03 \\ - 4.29 \\ \hline 74 \end{array}$ <p>Subtract the tenths.</p>	$\begin{array}{r} 7.03 \\ - 4.29 \\ \hline 2.74 \end{array}$ <p>Subtract the ones.</p>
-------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------

3. Estimate and then find the value of $2.2 + 4.95$.

$$2.2 + 4.95 \approx 2 + 5$$

$$= 7$$

$$2.2 + 4.95 = 7.15$$

4. Estimate and then find the value of $8.05 - 3.47$.

$$8.05 - 3.47 \approx 8.10 - 3.50$$

$$= 4.60$$

$$8.05 - 3.47 = 4.58$$

digit in
up, if it is



Multiply and Divide Decimals by a 1-digit Whole Number

1. Multiply 8.62 by 4.

$\begin{array}{r} 8.62 \\ \times \quad 4 \\ \hline 8 \end{array}$ <p>Multiply the hundredths by 4.</p>	$\begin{array}{r} 8.62 \\ \times \quad 4 \\ \hline 48 \end{array}$ <p>Multiply the tenths by 4.</p>	$\begin{array}{r} 8.62 \\ \times \quad 4 \\ \hline 34.48 \end{array}$ <p>Multiply the ones by 4.</p>
--------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------

2. Divide 3.15 by 5.

$\begin{array}{r} 0.6 \\ 5 \overline{) 3.15} \\ \underline{30} \\ 1 \end{array}$ <p>Divide 31 tenths by 5.</p>	$\begin{array}{r} 0.63 \\ 5 \overline{) 3.15} \\ \underline{30} \\ 15 \\ \underline{15} \\ 0 \end{array}$ <p>Divide 15 hundredths by 5.</p>
----------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------

3. Estimate, and then find the value of 3.12×4 .

$$3.12 \times 4 \approx 3 \times 4$$

$$= 12$$

$$3.12 \times 4 = 12.48$$

4. Estimate, and then find the value of $15.8 \div 8$.

$$15.8 \div 8 \approx 16 \div 8$$

$$= 2$$

$$15.8 \div 8 = 1.975$$

Multiplication by Tens, Hundreds or Thousands

The value of a decimal is increased 10 times when multiplied by 10.

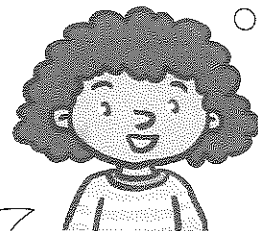
1. Multiply 0.425 by 10.

$$0.425 \times 10 = 4.25$$

2. Multiply 0.425 by 20.

$$\begin{aligned} 0.425 \times 20 &= 0.425 \times 2 \times 10 \\ &= 0.85 \times 10 \\ &= 8.5 \end{aligned}$$

0.425



When a decimal is multiplied by 10, we move the decimal point 1 place to the right.

The value of a decimal is increased 100 times when multiplied by 100.

3. Multiply 3.806 by 100.

$$3.806 \times 100 = 380.6$$

3.806

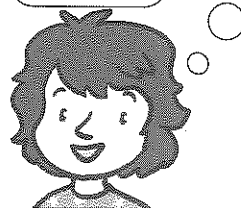


When a decimal is multiplied by 100, we move the decimal point 2 places to the right.

4. Multiply 3.806 by 500.

$$\begin{aligned} 3.806 \times 500 &= 3.806 \times 5 \times 100 \\ &= 19.03 \times 100 \\ &= 1903 \end{aligned}$$

19.03

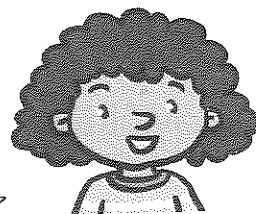


The value of a decimal is increased 1000 times when multiplied by 1000.

5. Multiply 4.782 by 1000.

$$4.782 \times 1000 = 4782$$

4.782



When a decimal is multiplied by 1000, we move the decimal point 3 places to the right.

6. Multiply 0.365 by 6000.

$$\begin{aligned} 0.365 \times 6000 &= 0.365 \times 6 \times 1000 \\ &= 2.19 \times 1000 \\ &= 2190 \end{aligned}$$

2.190



Division by Tens, Hundreds or Thousands

The value of a decimal is reduced 10 times when divided by 10.

1. Divide 0.89 by 10.

$$0.89 \div 10 = 0.089$$

0.89



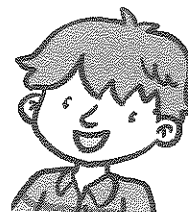
When a decimal is divided by 10, we move the decimal point 1 place to the left.

multiplied

2. Divide 52.5 by 30.

$$\begin{aligned} 52.5 \div 30 &= 52.5 \div 3 \div 10 \\ &= 17.5 \div 10 \\ &= 1.75 \end{aligned}$$

17.5



multiplied
decimal
point.

The value of a decimal is reduced 100 times when divided by 100.

3. Divide 18.8 by 100.

$$18.8 \div 100 = 0.188$$

18.8

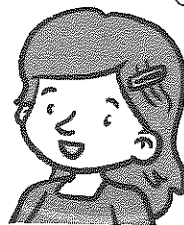


When a decimal is divided by 100, we move the decimal point 2 places to the left.

4. Divide 27.9 by 900.

$$\begin{aligned} 27.9 \div 900 &= 27.9 \div 9 \div 100 \\ &= 3.1 \div 100 \\ &= 0.031 \end{aligned}$$

3.1



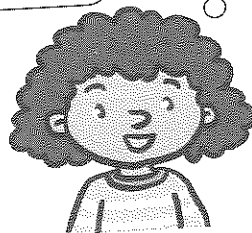
divided
by 100

The value of a decimal is reduced 1000 times when divided by 1000.

5. Divide 62.7 by 1000.

62.7

$$62.7 \div 1000 = 0.0627$$



When a decimal is divided by 1000, we move the decimal point 3 places to the left.

6. Divide 49 by 7000.

$$\begin{aligned} 49 \div 7000 &= 49 \div 7 \div 1000 \\ &= 7 \div 1000 \\ &= 0.007 \end{aligned}$$

7



Multiplication by a 2-digit Whole Number

Multiply 6.80 by 15.

$$\begin{aligned} 6.80 \times 15 &= 6.80 \times 10 + 6.80 \times 5 \\ &= 68.0 + 34.0 \\ &= 102 \end{aligned}$$

$$6.80 \approx 7$$

$$\begin{aligned} 6.80 \times 15 &\approx 7 \times 15 \\ &= 105 \end{aligned}$$

The answer is reasonable as it is close to the estimate.

Division by a 2-digit Whole Number

Divide 61.44 by 24.

$$\begin{array}{r} 2. \\ 24 \overline{) 61.44} \\ \underline{48} \\ 13 \end{array}$$

$$\begin{array}{r} 2.5 \\ 24 \overline{) 61.44} \\ \underline{48} \\ 134 \\ \underline{120} \\ 14 \end{array}$$

$$\begin{array}{r} 2.56 \\ 24 \overline{) 61.44} \\ \underline{48} \\ 134 \\ \underline{120} \\ 144 \\ \underline{144} \\ 0 \end{array}$$

Estimate:

$$61.44 \div 24 \approx 60 \div 20 = 3$$

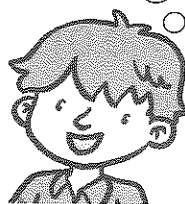
Multiplication by a Decimal

When a decimal is multiplied by 0.1, we move the decimal point 1 place to the left.

1. Multiply 25.6 by 0.1.

$$25.6 \times 0.1 = 2.56$$

25.6



When a decimal is multiplied by 0.1, we move the decimal point 1 place to the left.

2. Multiply 34.2 by 0.5.

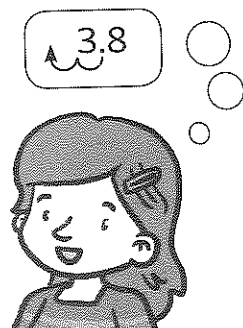
$$\begin{aligned} 34.2 \times 0.5 &= 34.2 \times 5 \times 0.1 \\ &= 171 \times 0.1 \\ &= 17.1 \end{aligned}$$

When a decimal is multiplied by 0.01, we move the decimal point 2 places to the left.

3. Multiply 3.8 by 0.01.

$$3.8 \times 0.01 = 0.038$$

When a decimal is multiplied by 0.01, we move the decimal point 2 places to the left.



4. Multiply 42.8 by 0.05.

$$\begin{aligned} 42.8 \times 0.05 &= 42.8 \times 5 \times 0.01 \\ &= 214 \times 0.01 \\ &= 2.14 \end{aligned}$$

5. Estimate, and then find the value of 8.2×0.09 .

$$\begin{aligned} 8.2 \times 0.09 &\approx 8 \times 0.09 \\ &= 0.72 \end{aligned}$$

$$\begin{aligned} 8.2 \times 0.09 &= 8.2 \times 9 \times 0.01 \\ &= 73.8 \times 0.01 \\ &= 0.738 \end{aligned}$$

Division by a Decimal

1. Divide 49.28 by 0.7.

$$49.28 \div 0.7 = 492.8 \div 7 \\ = 70.4$$

$$49.28 \div 0.7$$

$$\begin{array}{r} 70.4 \\ 7 \overline{) 492.8} \\ \underline{49} \\ 028 \\ \underline{28} \\ 0 \end{array}$$



2. Find the value of $8.648 \div 0.88$ correct to 2 decimal places.

$$8.648 \div 0.88 = 864.8 \div 88$$

$$8.648 \div 0.88$$

$$\begin{array}{r} 9.827 \\ 88 \overline{) 864.800} \\ \underline{792} \\ 728 \\ \underline{704} \\ 240 \\ \underline{176} \\ 640 \\ \underline{616} \\ 24 \end{array}$$



$$8.648 \div 0.88 \approx 9.83$$

3. Estimate, and then find the value of $248.6 \div 0.55$.

$$248.6 \div 0.55 \approx 250 \div 0.5 \\ = 500$$

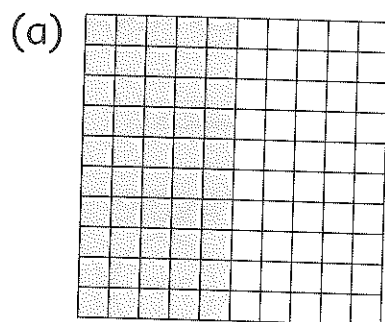
$$248.6 \div 0.55 = 24860 \div 55 \\ = 452$$

$$248.6 \div 0.55$$

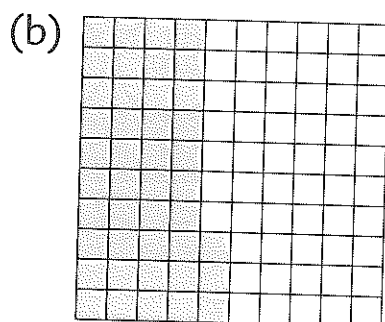


Exercise 1 : Tenths, Hundredths and Thousandths

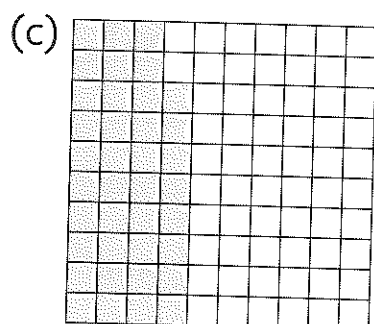
1. Write a decimal for each of the following.



5 tenths = _____

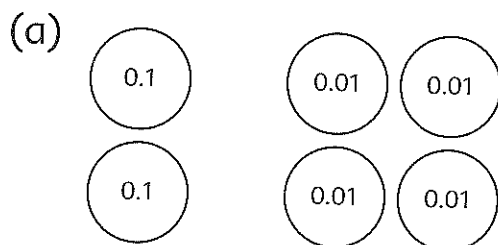


43 hundredths = _____

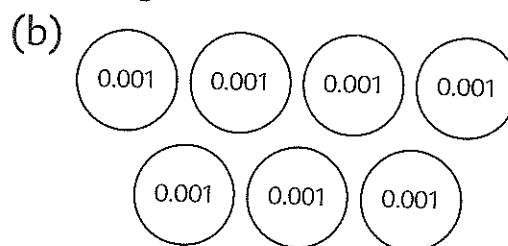


3 tenths 8 hundredths = _____

2. Write a decimal for each of the following.

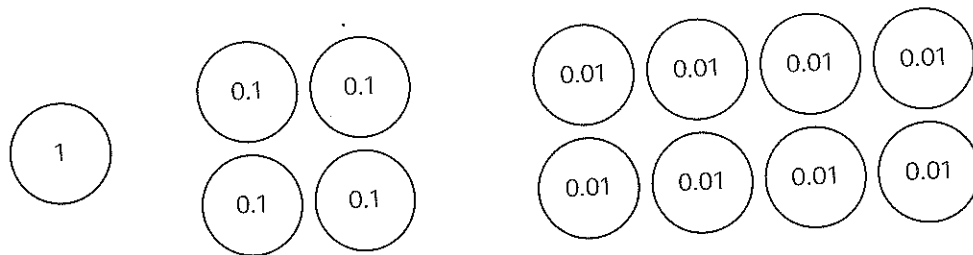


2 tenths 4 hundredths
= _____



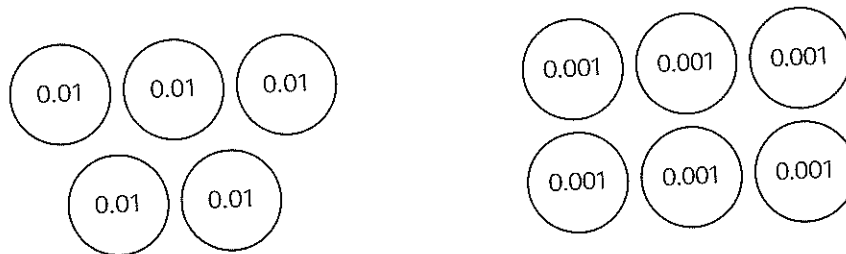
7 thousandths
= _____

(c)



1 one 4 tenths 8 hundredths = _____

(d)



5 hundredths 6 thousandths = _____

(e) 7 tenths 2 hundredths 3 thousandths = _____

(f) 8 tenths 1 thousandth = _____

(g) 4 ones 3 tenths 9 thousandths = _____

(h) 6 ones 5 thousandths = _____

3. Fill in the missing fraction in each of the following.

(a) $0.26 = \frac{2}{10} + \boxed{}$

(b) $1.3 = 1 + \boxed{}$

(c) $2.47 = 2 + \boxed{}$

(d) $4.09 = 4 + \boxed{}$

(e) $5.271 = 5 + 0.2 + 0.07 + \boxed{}$

(f) $38.209 = 38 + \boxed{}$

4. Fill in the missing decimal in each of the following.

(a) $0.4 + 0.08 = \boxed{}$

(b) $4 + 0.2 = \boxed{}$

(c) $0.81 + 0.2 = \boxed{}$

(d) $3.57 + 5 = \boxed{}$

(e) $7.123 = 7 + 0.1 + 0.02 + \boxed{}$

(f) $19.024 = 19 + \boxed{}$

5. Look at the table below and fill in the blanks.

Ones	Tenths	Hundredths	Thousandths
6	2	1	5

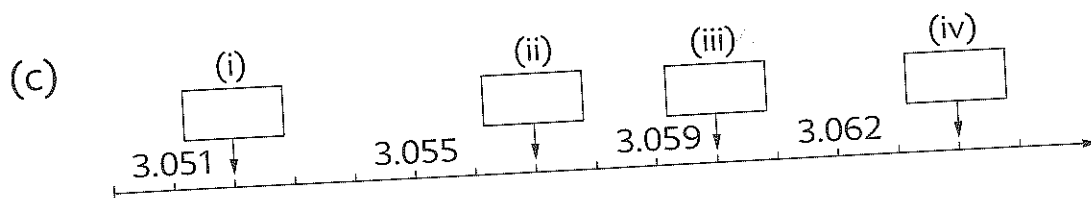
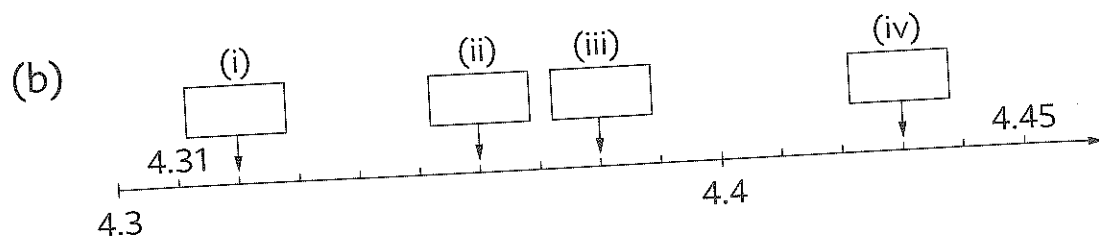
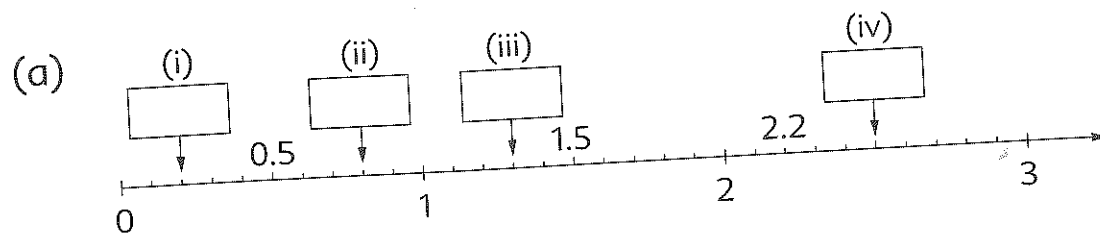
(a) The number 6.215 is made up of _____ ones,
_____ tenths, _____ hundredths and
_____ thousandths.

(b) In 6.215, the digit _____ is in the hundredths
place. The value of the digit is _____.

(c) The digit _____ is in the thousandths place.
The value of the digit is _____.

(d) The digit _____ is in the tenths place. The value
of the digit is _____.

6. Write the missing decimal in each box.



7. Fill in the blanks.

(a) _____ is 0.001 less than 1.9.

(b) _____ is 0.001 more than 1.99.

(c) 1 is 0.001 more than _____.

(d) 1.999 is 0.001 less than _____.

8. Circle the smallest number in each set.

(a) 4.105, 3.102

(b) 10.2, 10.199

(c) 11.11, 11.111

(d) 8.01, 8.001

(e) 7.15, 7.105, 7.015, 7.1

(f) 0.98, 0.988, 1, 0.01

(g) 658.1, 65.81, 0.658, 6.581

(h) 0.5, 0.005, 0.05, 5

9. Arrange the numbers in each set in decreasing order.

(a) 8.808 8.08 8.88 8.088

(b) 3.2 3.19 3.196 3.025

10. Express each fraction as a decimal.

(a) $\frac{2}{5} =$

(b) $\frac{5}{8} =$

(c) $1\frac{7}{10} =$

(d) $4\frac{1}{4} =$

11. Express each decimal as a fraction in its simplest form.

(a) 1.6 =	(b) 0.08 =
(c) 3.45 =	(d) 5.002 =

Exercise 2 : Approximation

1. Round off each of the following to the nearest whole number.

(a) $200.4 \text{ km} \approx \underline{\hspace{2cm}} \text{ km}$

(b) $32.35 \text{ km} \approx \underline{\hspace{2cm}} \text{ km}$

(c) $0.801 \text{ l} \approx \underline{\hspace{2cm}} \text{ l}$

(d) $18.6 \text{ l} \approx \underline{\hspace{2cm}} \text{ l}$

(e) $5.15 \text{ kg} \approx \underline{\hspace{2cm}} \text{ kg}$

(f) $7.734 \text{ kg} \approx \underline{\hspace{2cm}} \text{ kg}$

(g) $9.099 \text{ cm} \approx \underline{\hspace{2cm}} \text{ cm}$

(h) $10.55 \text{ cm} \approx \underline{\hspace{2cm}} \text{ cm}$

2. Round off each of the following to 1 decimal place.

(a) $0.23 \underline{\hspace{2cm}}$

(b) $4.07 \underline{\hspace{2cm}}$

(c) $5.451 \underline{\hspace{2cm}}$

(d) $13.609 \underline{\hspace{2cm}}$

(e) $20.764 \underline{\hspace{2cm}}$

(f) $11.006 \underline{\hspace{2cm}}$

(g) 33.038 _____

(h) 25.95 _____

3. Round off each of the following to 2 decimal places.

(a) 3.146 _____

(b) 8.432 _____

(c) 1.054 _____

(d) 0.005 _____

(e) 12.307 _____

(f) 15.243 _____

(g) 27.091 _____

(h) 39.918 _____

Exercise 3 : Add and Subtract Decimals

1. Add or subtract.

(a) $1.032 + 0.1 =$ _____

(b) $5.174 + 0.04 =$ _____

(c) $2.26 + 0.002 =$ _____

(d) $4.076 + 0.003 =$ _____

(e) $6.505 + 0.05 =$ _____

(f) $3.651 - 0.5 =$ _____

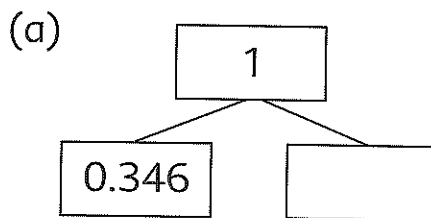
(g) $7.263 - 0.06 =$ _____

(h) $8.149 - 0.008 =$ _____

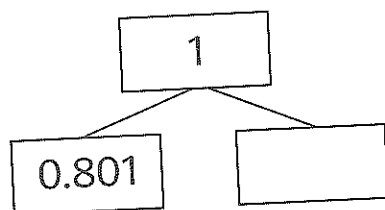
(i) $5.3 - 0.01 =$ _____

(j) $5.3 - 0.001 =$ _____

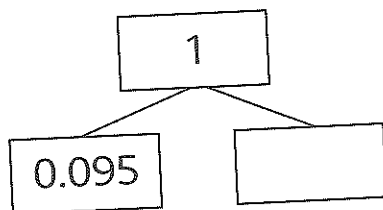
2. Write the missing number to make 1.



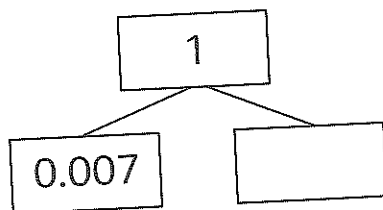
(b)



(c)



(d)



3. Estimate, and then find the value of each of the following.

(a) $13.52 + 12.48$ $\approx 14 + 12$ $=$	(b) $21.05 + 14.71$ \approx $=$
(c) $17.35 - 6.53$ $\approx 17 - 7$ $=$	(d) $24.88 - 24.17$ \approx $=$

Exercise 4 : Multiply and Divide Decimals by a 1-digit Whole Number

1. Multiply or divide.

(a) $4.53 \times 3 =$ _____

(b) $8.79 \times 8 =$ _____

(c) $56.7 \div 7 =$ _____

(d) $9.36 \div 4 =$ _____

(e) $40.5 \times 9 =$ _____

(f) $63.92 \div 8 =$ _____

2. Estimate, and then find the value of each of the following.

(a) $3.15 \times 5 \approx 3 \times 5$
=

(b) $5.6 \times 7 \approx$
=

(c) $7.8 \div 4 \approx$
=

(d) $16.2 \div 4 \approx$
=

3. Express each fraction as a decimal correct to 1 decimal place.

(a) $\frac{5}{7} \approx$	(b) $\frac{1}{4} \approx$
(c) $3\frac{1}{9} \approx$	(d) $2\frac{7}{8} \approx$

4. Express each fraction as a decimal correct to 2 decimal places.

(a) $\frac{1}{3} \approx$	(b) $\frac{4}{9} \approx$
(c) $1\frac{6}{7} \approx$	(d) $4\frac{10}{12} \approx$

Exercise 5 : Multiplication by Tens, Hundreds or Thousands

1. Complete the following table.

	Number	$\times 10$	$\times 100$	$\times 1000$
(a)	0.5			
(b)	0.29			
(c)	3.25			
(d)	7.018			
(e)	5.367			
(f)	10.401			

2. Fill in the missing factors.

(a) $1.35 \times \underline{\hspace{2cm}} = 135$

(b) $1000 \times \underline{\hspace{2cm}} = 700$

(c) $2.05 \times \underline{\hspace{2cm}} = 2050$

(d) $\underline{\hspace{2cm}} \times 3.756 = 37.56$

(e) $5.183 \times \underline{\hspace{2cm}} = 518.3$

(f) $\underline{\hspace{2cm}} \times 0.068 = 68$

(g) $4.002 \times \underline{\hspace{2cm}} = 40.02$

(h) $\underline{\hspace{2cm}} \times 6.6 = 6600$

(i) $11.26 \times \underline{\hspace{2cm}} = 11,260$

(j) $\underline{\hspace{2cm}} \times 0.01 = 1$

(k) $0.137 \times \underline{\hspace{2cm}} = 137$

(l) $\underline{\hspace{2cm}} \times 21.9 = 2190$

3. Multiply.

(a) 0.6×30 $= 1.8 \times 10$ $=$	(b) 0.02×40 $=$
(c) 2.5×20 $=$	(d) 1.12×50 $=$
(e) 11.3×60 $=$	(f) 0.8×200 $=$
(g) 0.15×300 $=$	(h) 1.9×500 $=$
(i) 1.25×700 $=$	(j) 2.04×600 $=$
(k) 15.5×400 $=$	(l) 0.007×2000 $=$
(m) 0.039×5000 $=$	(n) 2.067×3000 $=$
(o) 3.4×7000 $=$	(p) 9.17×6000 $=$
(q) 13.1×8000 $=$	(r) 30.02×9000 $=$

Exercise 6 : Division by Tens, Hundreds or Thousands

1. Complete the following table.

	Number	$\div 10$	$\div 100$	$\div 1000$
(a)	1452			
(b)	63			
(c)	5			
(d)	2007			
(e)	381			
(f)	79			

2. Fill in the missing factors.

- | | |
|-------------------------------------------------|--------------------------------------------------|
| (a) $34 \div \underline{\hspace{2cm}} = 0.34$ | (b) $\underline{\hspace{2cm}} \div 1000 = 0.06$ |
| (c) $123 \div \underline{\hspace{2cm}} = 12.3$ | (d) $\underline{\hspace{2cm}} \div 1000 = 0.418$ |
| (e) $8.4 \div \underline{\hspace{2cm}} = 0.084$ | (f) $\underline{\hspace{2cm}} \div 100 = 0.275$ |
| (g) $70.4 \div \underline{\hspace{2cm}} = 7.04$ | (h) $\underline{\hspace{2cm}} \div 1000 = 3.04$ |
| (i) $99 \div \underline{\hspace{2cm}} = 0.099$ | (j) $\underline{\hspace{2cm}} \div 10 = 0.9$ |
| (k) $2620 \div \underline{\hspace{2cm}} = 26.2$ | (l) $\underline{\hspace{2cm}} \div 10 = 0.01$ |

3. Divide:

(a) $3.6 \div 30$ $= 1.2 \div 10$ $=$	(b) $0.14 \div 20$ $=$
(c) $19.52 \div 40$ $=$	(d) $28.5 \div 60$ $=$
(e) $170 \div 50$ $=$	(f) $165.6 \div 80$ $=$
(g) $10.5 \div 500$ $= 2.1 \div 100$ $=$	(h) $12 \div 600$ $=$
(i) $9.6 \div 300$ $=$	(j) $45.5 \div 700$ $=$
(k) $162 \div 200$ $=$	(l) $3150 \div 700$ $=$
(m) $48 \div 2000$ $= 24 \div 1000$ $=$	(n) $84 \div 7000$ $=$
(o) $9 \div 3000$ $=$	(p) $164 \div 4000$ $=$
(q) $200 \div 8000$ $=$	(r) $3005 \div 5000$ $=$

Exercise 7 : Multiplication by a 2-digit Whole Number

1. Estimate the value of each of the following.

(a) 12.08×19 $\approx 10 \times 20$ $=$	(b) 19.74×22 \approx $=$
(c) 21.05×38 \approx $=$	(d) 429.27×58 \approx $=$
(e) 315.9×48 \approx $=$	(f) 9.85×32 \approx $=$
(g) 61.65×69 \approx $=$	(h) 0.98×71.48 \approx $=$

2. Multiply.

$$\begin{array}{r} \text{(a)} \quad 2.5 \\ \times \quad 46 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(b)} \quad 0.34 \\ \times \quad 32 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(c)} \quad 41.8 \\ \times \quad 25 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(d)} \quad 58.09 \\ \times \quad 17 \\ \hline \end{array}$$

$$\text{(e)} \quad 0.06 \times 35$$

$$\text{(f)} \quad 0.12 \times 84$$

(g) 9.7×97

=

(h) 6.2×58

=

(i) 15.6×42

=

(j) 27.03×66

=

(k) 80.23×29

=

(l) 136.5×31

=

(m) 207.1×24

=

(n) 390.2×18

=

Exercise 8 : Division by a 2-digit Whole Number

1. Estimate the value of each of the following.

(a) $287.5 \div 46$
 \approx

(b) $183.4 \div 48$
 \approx

2. Divide.

(a) $498.75 \div 95$

(b) $926.35 \div 97$

3. Find the value of each of the following correct to 2 decimal places.

(a) $68.5 \div 47$

(b) $0.395 \div 18$

(c) $723.2 \div 35$

(d) $46.98 \div 51$

(e) $9.86 \div 24$

Exercise 9 : Multiplication by a Decimal

1. Multiply.

(a) 16.5×0.9

(b) 28.7×0.3

(c) 3.67×0.1

(d) 50.15×0.4

(e) 0.25×0.2

(f) 4.32×0.8

(g) 9.76×0.7

(h) 13.9×0.6

2. Multiply.

(a) 19.2×0.03

(b) 0.4×0.06

(c) 32.5×0.08

(d) 8.6×0.09

(e) 64.1×0.01

(f) 0.5×0.05

(g) 27.8×0.65

(h) 10.3×0.17

Exercise 10 : Division by a Decimal

1. Divide.

(a) $800 \div 0.01$

(b) $6 \div 0.001$

(c) $4.684 \div 0.2$

(d) $72.9 \div 0.08$

(e) $96.45 \div 0.03$

(f) $52.44 \div 0.4$

(g) $25.42 \div 6.2$

(h) $630.8 \div 15.2$

2. Find the value of each of the following correct to 2 decimal places.

(a) $88.3 \div 6.3$

(b) $52.67 \div 0.36$

(c) $96.4 \div 5.5$

Unit 8 : Measures and Volume

Friendly Notes

Conversion of Measures

$$\begin{array}{ll} 1 \text{ m} = 100 \text{ cm} & 1 \text{ yd} = 3 \text{ ft} \\ 0.1 \text{ m} = 10 \text{ cm} & 1 \text{ ft} = 12 \text{ in.} \\ 0.01 \text{ m} = 1 \text{ cm} & \\ 1 \text{ km} = 1000 \text{ m} & \end{array}$$

1. Express 3.75 km in meters.

$$\begin{aligned} 3.75 \text{ km} &= 3.75 \times 1000 \\ &= 3750 \text{ m} \end{aligned}$$

2. Express 42 in. in ft.

$$\begin{aligned} 42 \text{ in.} &= \frac{42}{12} \text{ ft} \\ &= 3\frac{1}{2} \text{ ft} \end{aligned}$$

$$\begin{array}{ll} 1 \text{ kg} = 1000 \text{ g} & 1 \text{ lb} = 16 \text{ oz} \\ 1 \text{ g} = 0.001 \text{ kg} & \end{array}$$

3. Express 320 g in kg.

$$\begin{aligned} 320 \text{ g} &= \frac{320}{1000} \text{ kg} \\ &= \frac{8}{25} \text{ kg} \end{aligned}$$

4. Express 64 oz in lb.

$$\begin{aligned} 64 \text{ oz} &= \frac{64}{16} \text{ lb} \\ &= 4 \text{ lb} \end{aligned}$$

$$1 \ell = 1000 \text{ ml}$$

$$1 \text{ gal} = 4 \text{ qt}$$

$$1 \text{ qt} = 2 \text{ pt}$$

$$1 \text{ qt} = 4 \text{ c}$$

5. Express 0.58 ℓ in ml.

$$\begin{aligned} 0.58 \ell &= 0.58 \times 1000 \text{ ml} \\ &= 580 \text{ ml} \end{aligned}$$

6. Express 10 qt in gal.

$$\begin{aligned} 10 \text{ qt} &= \frac{10}{4} \text{ gal} \\ &= 2.5 \text{ gal} \end{aligned}$$

7. Express 84 pt in qt.

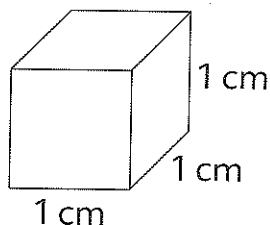
$$\begin{aligned} 84 \text{ pt} &= \frac{84}{2} \text{ qt} \\ &= 42 \text{ qt} \end{aligned}$$

Volume of Rectangular Prisms

The **volume** of a solid is the amount of space it occupies.
The volume of a unit cube is 1 cubic unit.

Each edge of the cube is 1 cm long.

The volume of the cube is 1 cubic centimeter (cm^3).



The cubic centimeter (cm^3) is a unit of volume.

The cubic inch (in.^3), cubic foot (ft^3) and cubic meter (m^3) are other units of volume.

Volume of rectangular prism = length \times width \times height

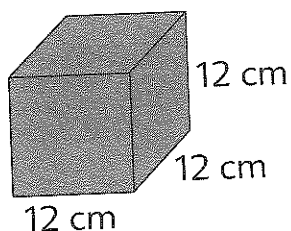
1. Find the volume of the rectangular prism which measures 18 cm by 20 cm by 10 cm.

$$\begin{aligned}\text{Volume of rectangular prism} &= 18 \times 20 \times 10 \\ &= 3600 \text{ cm}^3\end{aligned}$$

2. Find the height of the rectangular prism which has a base area of 24 m^2 and a volume of 120 m^3 .

$$\begin{aligned}\text{Height of rectangular prism} &= \frac{\text{volume}}{\text{base area}} \\ &= \frac{120}{24} \\ &= 5 \text{ m}\end{aligned}$$

3. Find the volume of the cube.



$$\begin{aligned}\text{Volume of cube} &= 12 \times 12 \times 12 \\ &= 1728 \text{ cm}^3\end{aligned}$$

4. A rectangular container which measures 24 cm by 18 cm by 10 cm is $\frac{3}{4}$ filled with water. Find the volume of water in the container.

$$\begin{aligned}\text{Volume of water in container} &= \frac{3}{4} \times (24 \times 18 \times 10) \\ &= 3240 \text{ cm}^3\end{aligned}$$

5. A rectangular tank 16 cm long and 15 cm wide is filled with water to a depth of 8 cm. If 240 cm^3 more water is needed to fill the tank, find the height of the tank.

$$\begin{aligned}\text{Volume of water in tank} &= 16 \times 15 \times 8 \\ &= 1920 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Volume of tank} &= 1920 + 240 \\ &= 2160 \text{ cm}^3\end{aligned}$$

$$\begin{aligned}\text{Height of tank} &= \frac{2160}{16 \times 15} \\ &= 9 \text{ cm}\end{aligned}$$

Exercise 1 : Conversion of Measures

1. Find the equivalent measures.

(a) $0.5 \text{ kg} = \underline{\hspace{2cm}} \text{ g}$ (b) $0.85 \text{ l} = \underline{\hspace{2cm}} \text{ ml}$

(c) $0.045 \text{ km} = \underline{\hspace{2cm}} \text{ m}$ (d) $0.76 \text{ m} = \underline{\hspace{2cm}} \text{ cm}$

(e) $0.095 \text{ l} = \underline{\hspace{2cm}} \text{ ml}$ (f) $0.06 \text{ km} = \underline{\hspace{2cm}} \text{ m}$

(g) $0.043 \text{ kg} = \underline{\hspace{2cm}} \text{ g}$ (h) $0.8 \text{ m} = \underline{\hspace{2cm}} \text{ cm}$

2. Find the equivalent measures.

(a) $1.35 \text{ km} = \underline{\hspace{2cm}} \text{ km} \underline{\hspace{2cm}} \text{ m}$

(b) $3.05 \text{ l} = \underline{\hspace{2cm}} \text{ l} \underline{\hspace{2cm}} \text{ ml}$

(c) $2.004 \text{ kg} = \underline{\hspace{2cm}} \text{ kg} \underline{\hspace{2cm}} \text{ g}$

(d) $4.8 \text{ m} = \underline{\hspace{2cm}} \text{ m} \underline{\hspace{2cm}} \text{ cm}$

(e) $0.035 \text{ km} = \underline{\hspace{2cm}} \text{ km} \underline{\hspace{2cm}} \text{ m}$

(f) $5.07 \text{ m} = \underline{\hspace{2cm}} \text{ m} \underline{\hspace{2cm}} \text{ cm}$

(g) $4.016 \text{ l} = \underline{\hspace{2cm}} \text{ l} \underline{\hspace{2cm}} \text{ ml}$

(h) $0.401 \text{ kg} = \underline{\hspace{2cm}} \text{ kg} \underline{\hspace{2cm}} \text{ g}$

3. Find the equivalent measures. Express each answer as a decimal.

(a) $3\ell\ 200\text{ ml} = \underline{\hspace{2cm}}\ell$

(b) $5\text{ m}\ 6\text{ cm} = \underline{\hspace{2cm}}\text{ m}$

(c) $2\text{ km}\ 72\text{ m} = \underline{\hspace{2cm}}\text{ km}$

(d) $4\text{ kg}\ 400\text{ g} = \underline{\hspace{2cm}}\text{ kg}$

(e) $2\text{ m}\ 52\text{ cm} = \underline{\hspace{2cm}}\text{ m}$

(f) $6\text{ km}\ 1\text{ m} = \underline{\hspace{2cm}}\text{ km}$

(g) $4\ell\ 35\text{ ml} = \underline{\hspace{2cm}}\ell$

(h) $3\text{ kg}\ 208\text{ g} = \underline{\hspace{2cm}}\text{ kg}$

4. Find the equivalent measures. Express each answer as a decimal.

(a) $7.3\text{ cm} = \underline{\hspace{2cm}}\text{ m}$

(b) $98\text{ g} = \underline{\hspace{2cm}}\text{ kg}$

(c) $267\text{ ml} = \underline{\hspace{2cm}}\ell$

(d) $304\text{ m} = \underline{\hspace{2cm}}\text{ km}$

(e) $1502\text{ ml} = \underline{\hspace{2cm}}\ell$

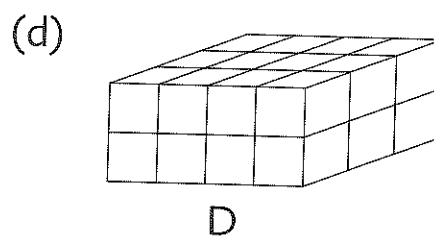
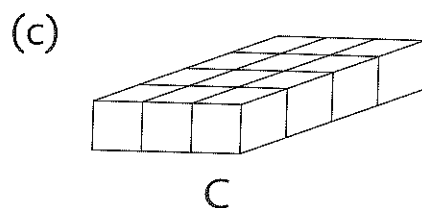
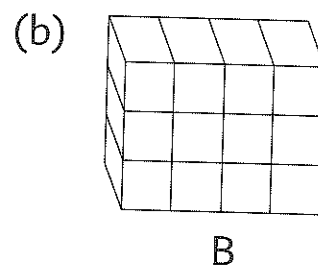
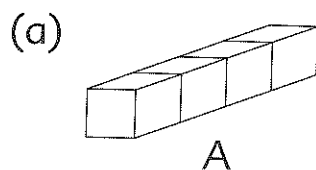
(f) $2008\text{ m} = \underline{\hspace{2cm}}\text{ km}$

(g) $3064\text{ g} = \underline{\hspace{2cm}}\text{ kg}$

(h) $4170\text{ cm} = \underline{\hspace{2cm}}\text{ m}$

Exercise 2 : Volume of Rectangular Prisms

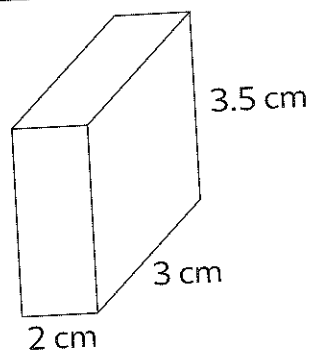
1. Each rectangular prism is made up of 1-cm cubes. Complete the table below.



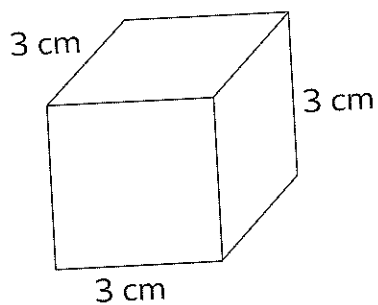
	Rectangular prism	Length	Width	Height	Volume
(a)	A				
(b)	B				
(c)	C				
(d)	D				

2. Find the volume of each prism.

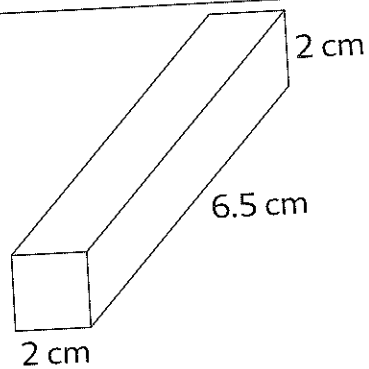
(a)



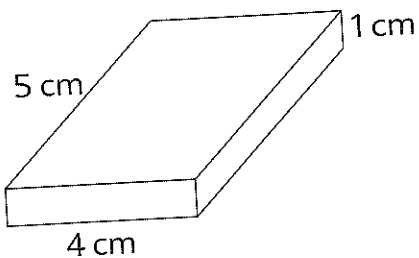
(b)



(c)

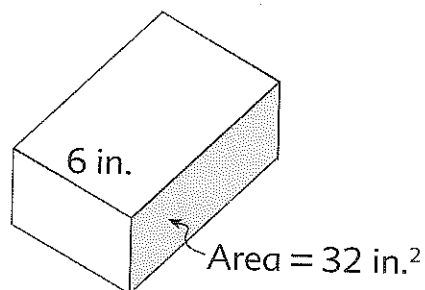


(d)

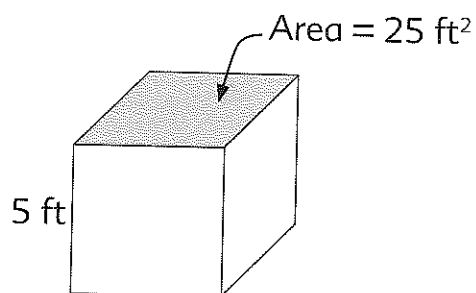


3. Find the volume of each prism.

(a)

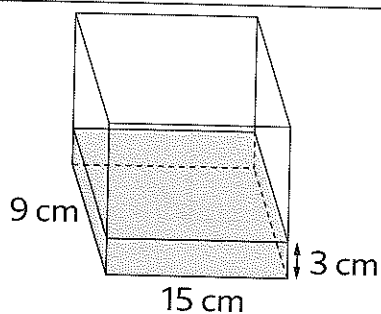


(b)

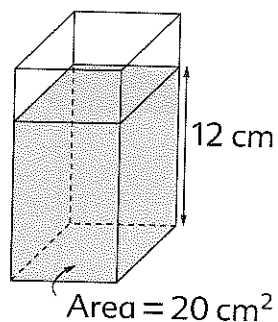


4. Find the volume of the water in each container in cubic centimeters.

(a)

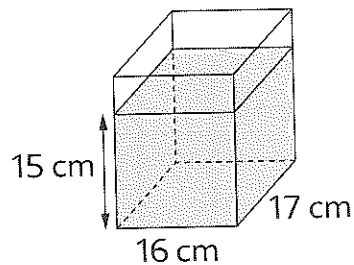


(b)

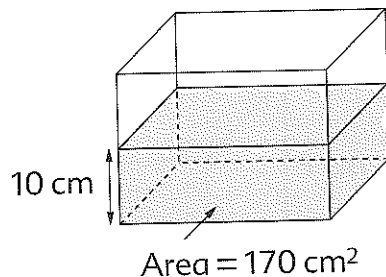


5. Find the volume of the water in each container in liters.
($1\text{ l} = 1000\text{ cm}^3$)

(a)

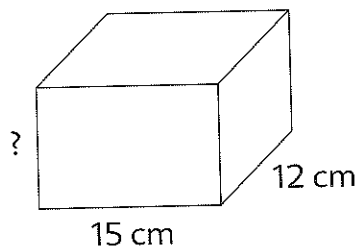


(b)



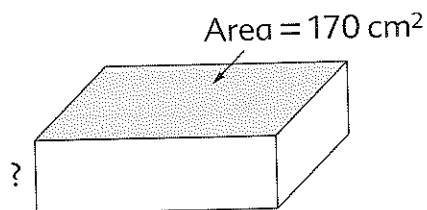
6. Find the length of the unknown edge of each rectangular prism.

(a)



$$\text{Volume} = 1800\text{ cm}^3$$

(b)

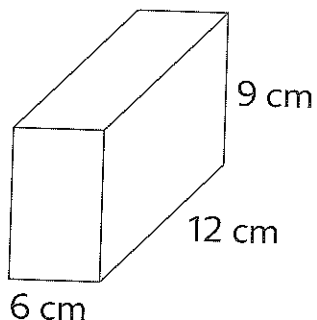


$$\text{Volume} = 1360\text{ cm}^3$$

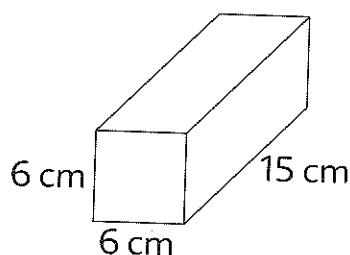
in liters.

7. How many rectangular prisms of edge 3 cm are needed to build each of the following rectangular prisms?

(a)

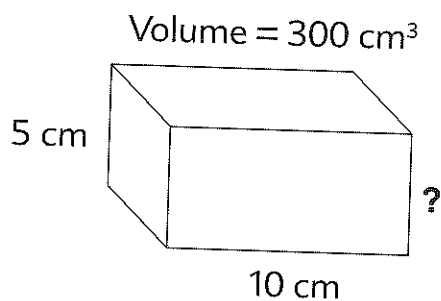


(b)

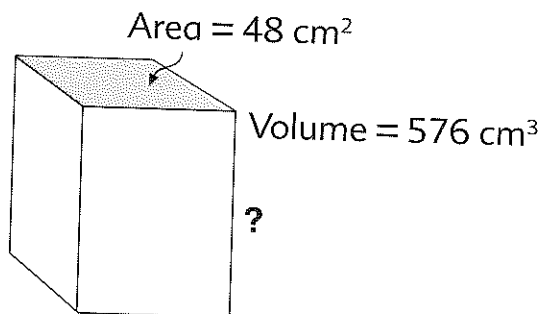


8. Find the height of each rectangular prism.

(a)



(b)



9. Do these. Show all your work clearly.

(a) The volume of a rectangular prism is 189 in.^3 . What is its length if its height is 7 in. and its width is 3 in.?

(b) A rectangular tank is 25 cm long, 16 cm wide and 30 cm high. It contains 8 ℓ of water. How many more liters of water can it contain? ($1 \ell = 1000 \text{ cm}^3$)

What is
3 in.?

- (c) The volume of a wooden block is 1200 cm^3 . Its length is 5 cm more than its width. If its length is 10 cm, find its height.

e and
any more

- (d) A rectangular can of base area 150 cm^2 and height 30 cm is filled with cooking oil. If 1500 cm^3 of the oil is used up, how much oil is left in the can? Give your answer in liters.

(e) A tank 30 cm long, 10 cm wide and 50 cm high is full of water. If the water is poured into containers measuring 5 cm long, 2 cm wide and 10 cm high, how many such containers are needed?

(f) A tank 60 cm long, 40 cm wide and 20 cm high is half-filled with water. If all the water is poured into an empty fish tank with a rectangular base measuring 48 cm by 25 cm, find the depth of the water in the fish tank.

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high, how

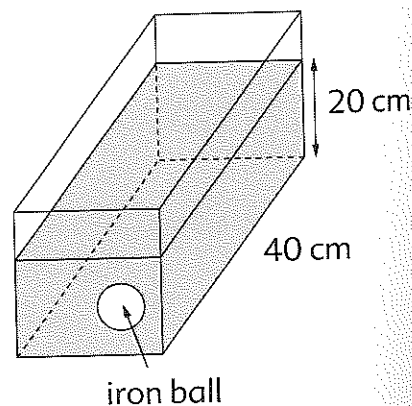
- (g) Tank A, measuring 20 cm by 30 cm by 10 cm, is full of water. Tank B, measuring 30 cm by 50 cm by 10 cm, is $\frac{2}{3}$ full of water. Find the difference in the amount of water in the two tanks. Give your answer in liters.

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in the

- (h) 9 liters of cooking oil are poured into rectangular containers, filling each up to a height of 30 cm. The base of each container measures 5 cm by 3 cm. How many containers are needed? ($1 \ell = 1000 \text{ cm}^3$)

- (i) A cubic tank of side 36 cm is half-filled with water. How much will the water level rise when a metal block of volume 5184 cm^3 is placed in the tank?

- (j) In the rectangular tank shown below, the volume of the water and the iron ball is 19.2 l . When the iron ball is removed from the tank, the water level drops by 5 cm. Find the volume of the iron ball. ($1 \text{ l} = 1000 \text{ cm}^3$)



water.
metal block

Unit 9 : Percentage

Friendly Notes

Percent

A **percentage** is a way of expressing a fraction with a denominator of 100.

A percentage is indicated by the symbol, % (percent).

1. Write 13 out of 100 as a percentage.

$$13 \text{ out of } 100 = 13\%$$

13% is another way of writing $\frac{13}{100}$ or 0.13.



2. Express 15% as a fraction in its simplest form.

$$\begin{aligned} 15\% &= \frac{15}{100} \\ &= \frac{3}{20} \end{aligned}$$

We read 15% as 15 percent.



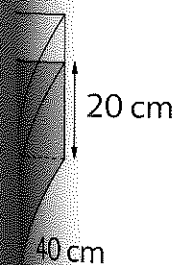
3. Express 88% as a decimal.

$$\begin{aligned} 88\% &= \frac{88}{100} \\ &= 0.88 \end{aligned}$$

88% means 88 out of 100.



me of the
on ball is
s by 5 cm.
(cm³)



Writing Fractions as Percentages

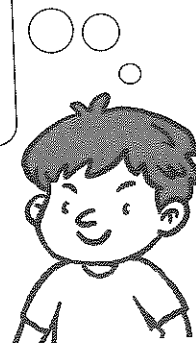
Express $\frac{36}{200}$ as a percentage.

Method 1:

$$\begin{aligned}\frac{36}{200} &= \frac{18}{100} \\ &= 18\%\end{aligned}$$

$$\frac{36}{200} = \frac{18}{100}$$

Diagram showing the simplification of the fraction $\frac{36}{200}$ to $\frac{18}{100}$ by dividing both the numerator and denominator by 2.



Method 2:

$$\begin{aligned}\frac{36}{200} &= \frac{36}{200} \times 100\% \\ &= 18\%\end{aligned}$$

Percentage of a Quantity

There are 45 children in a class. 40% of the children are girls.
How many boys are there in the class?

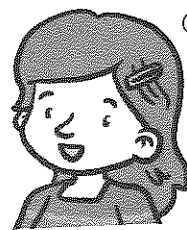
$$100\% - 40\% = 60\%$$

60% of the children are boys.

$$\begin{aligned}60\% \text{ of } 45 &= \frac{60}{100} \times 45 \\ &= 27\end{aligned}$$

There are 27 boys in the class.

1 whole is 100%.



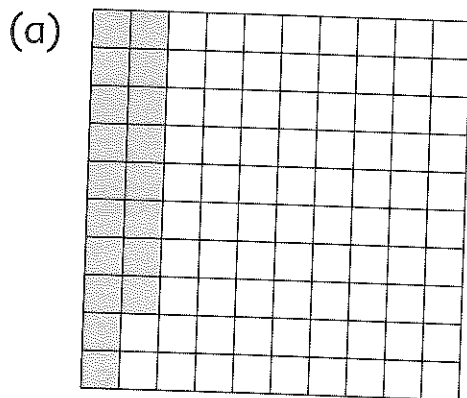
Name: _____

Class: _____

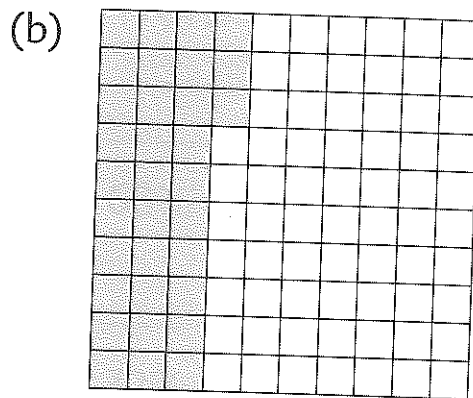
Date: _____

Exercise 1 : Percent

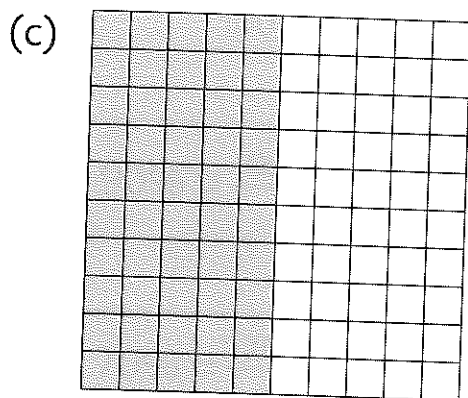
1. In each of the following, the whole is divided into 100 equal parts. What percentage of the whole is shaded?



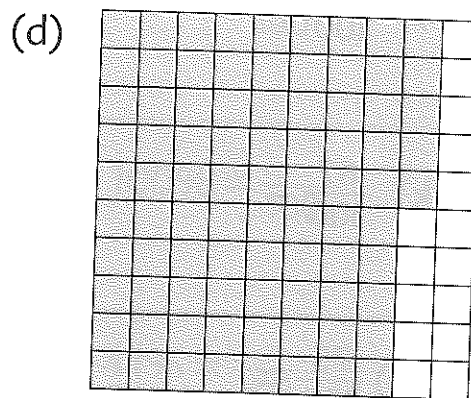
_____ %



_____ %



_____ %



_____ %

2. Express each fraction as a percentage.

(a) $\frac{7}{100} =$

(b) $\frac{21}{100} =$

(c) $\frac{1}{100} =$

(d) $\frac{36}{100} =$

(e) $\frac{10}{100} =$

(f) $\frac{2}{100} =$

(g) $\frac{8}{100} =$

(h) $\frac{60}{100} =$

(i) $\frac{55}{100} =$

(j) $\frac{98}{100} =$

(k) $\frac{67}{100} =$

(l) $\frac{9}{100} =$

(m) $\frac{75}{100} =$

(n) $\frac{80}{100} =$

(o) $\frac{32}{100} =$

(p) $\frac{5}{10} =$

(q) $\frac{6}{10} =$

(r) $\frac{8}{10} =$

3. Fill in the missing numerator or denominator.

(a) $4\% = \frac{\quad}{100}$	(b) $29\% = \frac{29}{\quad}$
(c) $34\% = \frac{\quad}{100}$	(d) $17\% = \frac{\quad}{100}$
(e) $56\% = \frac{\quad}{100}$	(f) $63\% = \frac{63}{\quad}$
(g) $78\% = \frac{\quad}{100}$	(h) $72\% = \frac{72}{\quad}$
(i) $6\% = \frac{\quad}{100}$	(j) $89\% = \frac{\quad}{100}$
(k) $90\% = \frac{90}{\quad}$	(l) $100\% = \frac{\quad}{100}$
(m) $70\% = \frac{70}{\quad}$	(n) $41\% = \frac{\quad}{100}$
(o) $3\% = \frac{3}{\quad}$	(p) $27\% = \frac{\quad}{100}$

4. Express each decimal as a percentage.

(a) $0.08 =$	(b) $0.7 =$
(c) $0.61 =$	(d) $0.43 =$
(e) $0.2 =$	(f) $0.01 =$
(g) $0.57 =$	(h) $0.38 =$
(i) $0.05 =$	(j) $0.95 =$

5. Express each percentage as a decimal.

(a) 12% =	(b) 2% =
(c) 27% =	(d) 41% =
(e) 42% =	(f) 58% =
(g) 60% =	(h) 75% =
(i) 88% =	(j) 93% =

6. Express each percentage as a fraction in its simplest form.

(a) 35% =	(b) 10% =
(c) 24% =	(d) 48% =
(e) 9% =	(f) 53% =
(g) 67% =	(h) 1% =
(i) 76% =	(j) 81% =

Exercise 2 : Writing Fractions as Percentages

1. Express each fraction as a percentage.

(a) $\frac{1}{5} =$	(b) $\frac{6}{15} =$
(c) $\frac{1}{20} =$	(d) $\frac{7}{25} =$
(e) $\frac{13}{25} =$	(f) $\frac{29}{50} =$
(g) $\frac{18}{30} =$	(h) $\frac{11}{20} =$

2. Write each of the following as a percentage.

(a) 6 out of 30	(b) 36 out of 90
(c) 35 out of 70	(d) 60 out of 80

(e) 30 out of 50	(f) 15 out of 60
(g) 36 out of 200	(h) 40 out of 500
(i) 48 out of 300	(j) 98 out of 200
(k) 80 out of 400	(l) 75 out of 500
(m) 114 out of 200	(n) 244 out of 400
(o) 285 out of 300	(p) 185 out of 500

3. Do these. Show all your work clearly.

(a) 45% of the fruit are oranges. What fraction of the fruit are oranges?

(b) 0.25 of a ribbon was used to decorate a lamp. What percentage of the ribbon was used?

(c) There are 30 people in the garden. 27 of them are children. What percentage of the people are children?

(d) 30 out of 40 students passed an examination. What percentage of the students passed the examination?

(e) In a fire, Mr. Pace saved $\frac{7}{20}$ of his goods. What percentage of the goods were saved?

(f) If 20 kg of butter is mixed with 5 kg of sugar, what percentage of the mixture is sugar?

- (g) A shopkeeper had 240 watches. He sold 84 watches.
- (i) What percentage of the watches were sold?
 - (ii) What percentage of the watches were not sold?

- (h) Stephanie spent 15% of her time on Science, 25% on Mathematics, 40% on English language and the rest of her time on Spanish language.
- (i) What fraction of her time did she spend on Science, Mathematics and English language altogether?
 - (ii) What fraction of her time did she spend on Spanish language?

- (i) At a concert, there are 28 boys and 12 girls.
- (i) What percentage of the children are boys?
 - (ii) What percentage of the children are girls?

- (j) Cameron bought 3 m 50 cm of wire. He used 2 m 10 cm of it.
- (i) What percentage of the wire was used?
 - (ii) What percentage of the wire was left?

Exercise 3 : Percentage of a Quantity

1. Find the value of each of the following.

(a) 8% of 250 cm	(b) 20% of \$1060
(c) 34% of 300 g	(d) 45% of 80 kg
(e) 50% of 750 m	(f) 78% of 500 ml

2. Do these. Show all your work clearly.

- (a) There are 385 people in a swimming pool. 60% of them are children. How many children are there?

- (b) Of 88 students, 75% passed the examination. How many students passed the examination?
- (c) 20% of a class play volleyball. There are 40 students in the class. How many students do not play volleyball?
- (d) Caleb bought a television set which cost \$1800. He had to pay 3% sales tax on \$1800. How much did he pay for the television set including the sales tax?

- (e) A camera costing \$520 is sold at a discount of 25%. What is the discounted price of the camera?
- (f) Olivia borrowed \$10,000 from a bank. The bank charges 4% interest per year. If she took the loan for a year, how much did she have to repay the bank at the end of the year?
- (g) A toy car which cost \$96 was sold at a loss of 25%. For how much was it sold?

- (h) Hannah bought a watch at a discount of 15%. Its usual price was \$270. How much did she pay for the watch?
- (i) The membership of a workers' association this year is 850. It is estimated that there will be an increase of 8% the next year. What is the membership expected to be next year?
- (j) A shopkeeper bought 100 bicycles. Each bicycle cost \$58. He sold all the bicycles at a profit of 20% each. How much profit did he make from selling the bicycles?

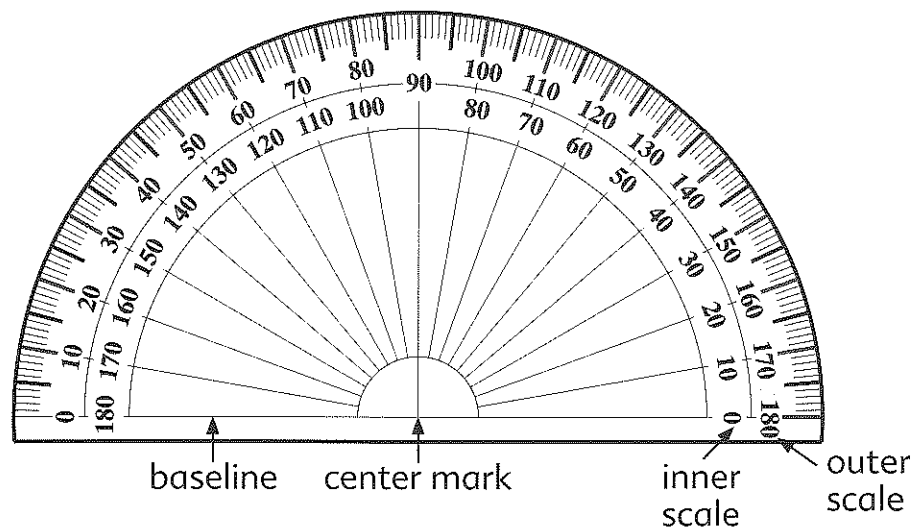
Its usual
watch?

Unit 10 : Angles

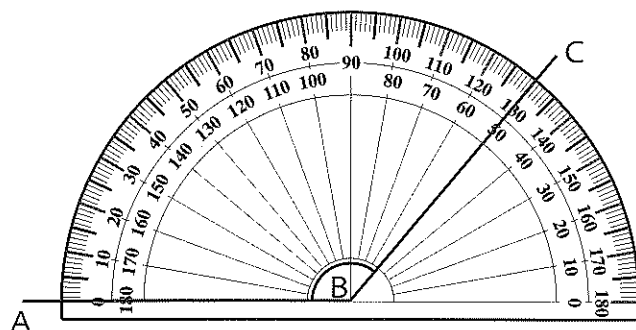
Friendly Notes

Measuring Angles

A **protractor** is used to measure angles.



1. Measure angle ABC.

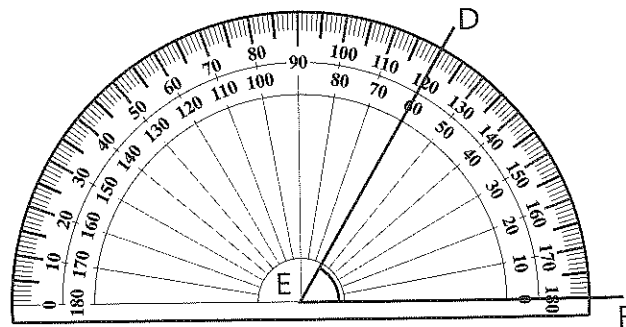


$$\angle ABC = 130^\circ$$

Place the baseline of the protractor on the horizontal line of the angle and make sure the center mark touches point B.

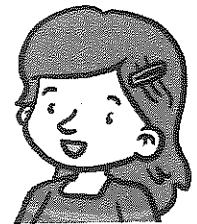
Read the outer scale.

2. Measure $\angle DEF$.



$$\angle DEF = 60^\circ$$

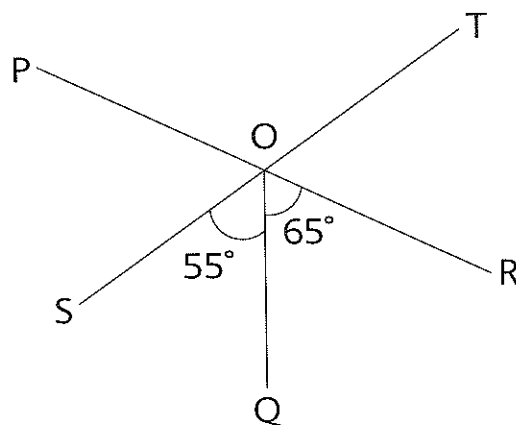
Read the inner scale.



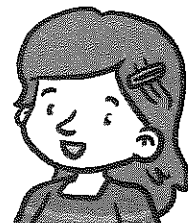
Finding Unknown Angles

Vertically opposite angles are equal.
The sum of the angles on a straight line is 180° .

1. In the figure, POR and SOT are straight lines.
Find (a) $\angle POT$, (b) $\angle TOR$.



$\angle POT$ and $\angle SOR$
are vertically
opposite angles.



$$\begin{aligned} \text{(a) } \angle POT &= \angle SOR \\ &= 55^\circ + 65^\circ \\ &= 120^\circ \end{aligned}$$

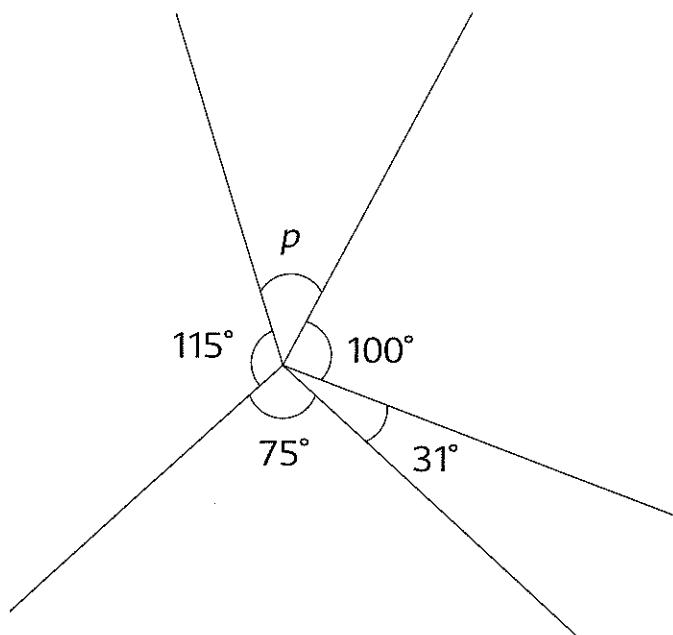
$$(b) \angle TOR = 180^\circ - 55^\circ - 65^\circ = 60^\circ$$

$\angle TOR$, $\angle SOQ$ and $\angle QOR$ are angles on a straight line.

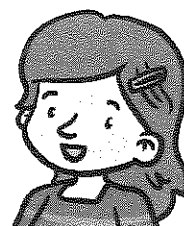


The sum of the angles at a point is 360° .

2. Find $\angle p$ in the figure.



The marked angles meet at a common point.



$$\begin{aligned} \angle p &= 360^\circ - 100^\circ - 31^\circ - 75^\circ - 115^\circ \\ &= 39^\circ \end{aligned}$$

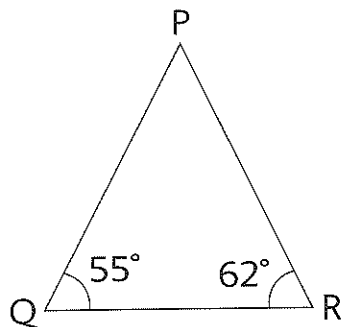
The sum of the angles that meet at a common point is 360° .



Sum of Angles of a Triangle

The three angles of a triangle add up to 180° .

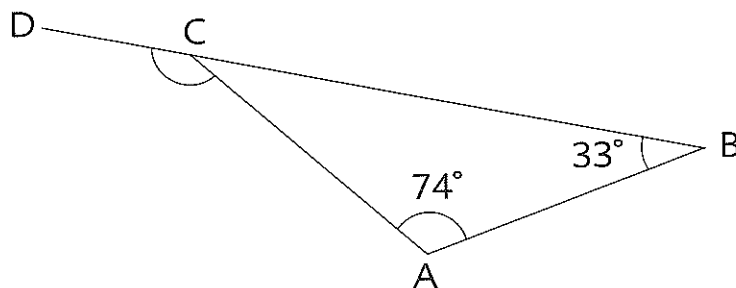
1. In triangle PQR, $\angle PQR = 55^\circ$ and $\angle PRQ = 62^\circ$. Find $\angle QPR$.



$$\begin{aligned}\angle QPR &= 180^\circ - 55^\circ - 62^\circ \\ &= 63^\circ\end{aligned}$$

The exterior angle of a triangle is equal to the sum of its interior opposite angles.

2. In triangle ABC, BC is extended to D, $\angle CAB = 74^\circ$ and $\angle ABC = 33^\circ$. Find $\angle ACD$.

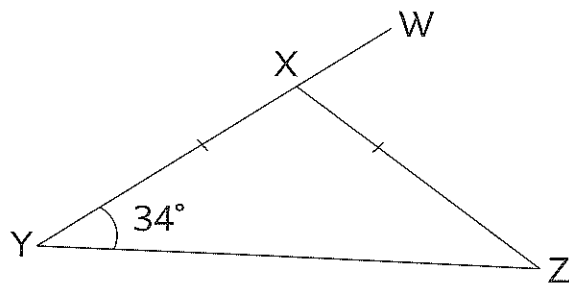


$$\begin{aligned}\angle ACD &= 74^\circ + 33^\circ \\ &= 107^\circ\end{aligned}$$

Isosceles and Equilateral Triangles

An **isosceles** triangle has 2 equal sides. The angles opposite the equal sides are equal.

1. In triangle XYZ, $XY = XZ$, $\angle XYZ = 34^\circ$ and WXY is a straight line. Find $\angle WXZ$.

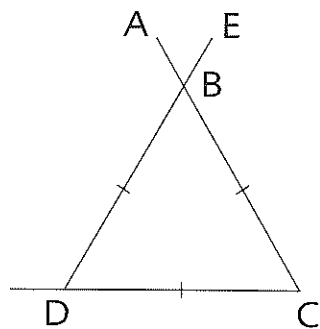


$$\begin{aligned}\angle XZY &= \angle XYZ \\ &= 34^\circ\end{aligned}$$

$$\begin{aligned}\angle WXZ &= 34^\circ + 34^\circ \\ &= 68^\circ\end{aligned}$$

An **equilateral** triangle has 3 equal sides and 3 equal angles. Each angle is 60° .

2. In the figure, EBD and ABC are straight lines. Find $\angle ABE$.

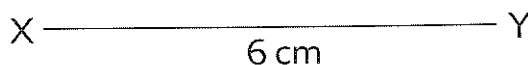


$$\begin{aligned}\angle DBC &= 60^\circ \\ \angle ABE &= \angle DBC \\ &= 60^\circ\end{aligned}$$

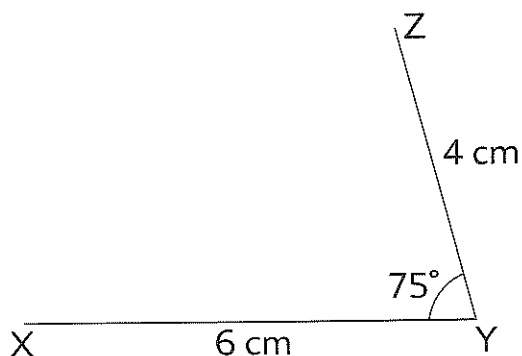
Drawing Triangles

Draw a triangle XYZ in which $XY = 6$ cm, $YZ = 4$ cm and $\angle XYZ = 75^\circ$.

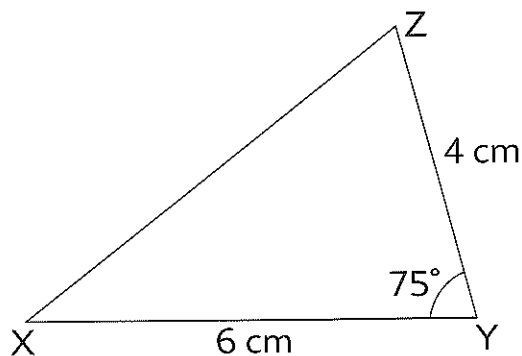
Step 1: Draw $XY = 6$ cm.



Step 2: Draw $\angle XYZ = 75^\circ$. Measure and mark $YZ = 4$ cm.



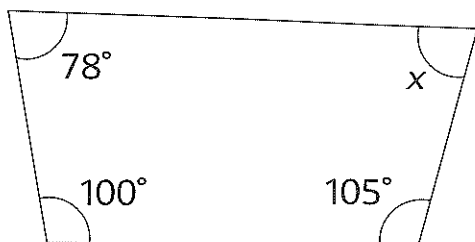
Step 3: Join Z to X.



Sum of Angles of a Quadrilateral

The angles of a quadrilateral add up to 360° .

Find $\angle x$ in the quadrilateral.



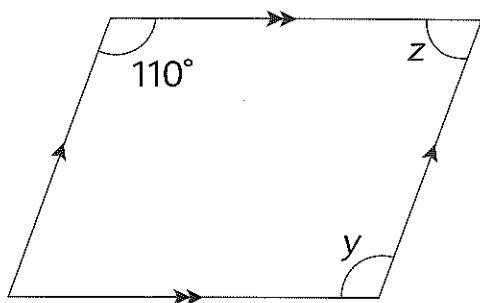
$$\begin{aligned}\angle x &= 360^\circ - 78^\circ - 100^\circ - 105^\circ \\ &= 77^\circ\end{aligned}$$

Parallelograms, Rhombuses and Trapezoids

The opposite angles of a parallelogram are equal.

Each pair of angles between two parallel sides add up to 180° .

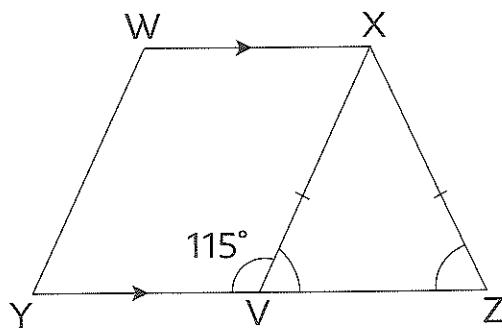
1. Find $\angle y$ in the parallelogram.



$$\angle y = 110^\circ$$

$$\begin{aligned}\angle z &= 180^\circ - 110^\circ \\ &= 70^\circ\end{aligned}$$

2. In trapezoid $WXYZ$, $WX \parallel YZ$, $XV = XZ$ and $\angle YVX = 115^\circ$. Find $\angle WXZ$.



$$\begin{aligned}\angle XVZ &= 180^\circ - 115^\circ \\ &= 65^\circ\end{aligned}$$

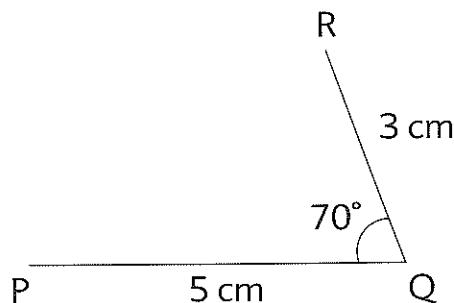
$$\begin{aligned}\angle XZY &= \angle XVZ \\ &= 65^\circ\end{aligned}$$

$$\begin{aligned}\angle WXZ &= 180^\circ - 65^\circ \\ &= 115^\circ\end{aligned}$$

Drawing Parallelograms and Rhombuses

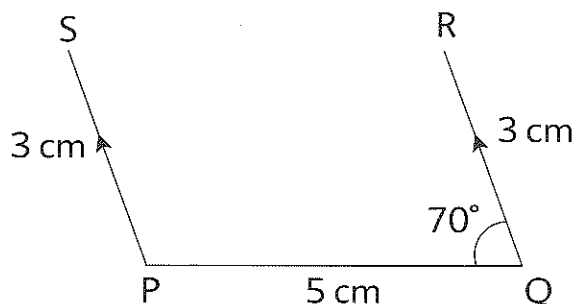
1. Draw a parallelogram $PQRS$ in which $PQ = 5$ cm, $QR = 3$ cm and $\angle PQR = 70^\circ$.

Step 1: Draw $PQ = 5$ cm.
Draw $\angle PQR = 70^\circ$ and mark $QR = 3$ cm.

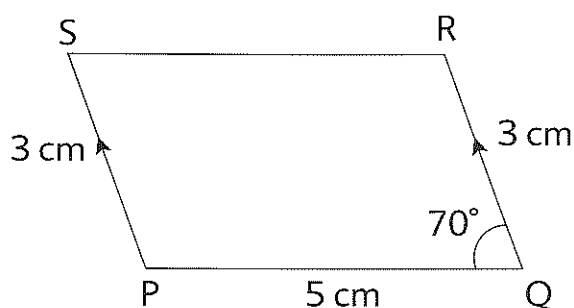


$\angle X = 115^\circ$.

Step 2: Draw $PS \parallel QR$ and mark $PS = 3$ cm.

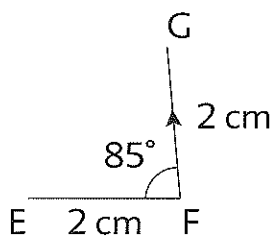


Step 3: Join SR .

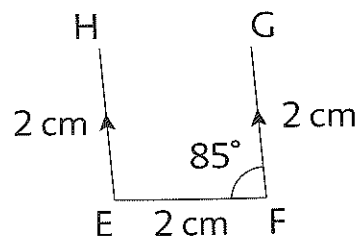


2. Draw a rhombus $EFGH$ in which $EF = 2$ cm and $\angle EFG = 85^\circ$.

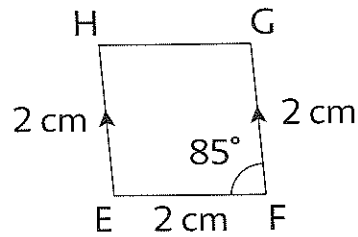
Step 1: Draw $EF = 2$ cm and $\angle EFG = 85^\circ$.
Mark $FG = 2$ cm.



Step 2: Draw $EH \parallel FG$ and mark $EH = 2 \text{ cm}$.



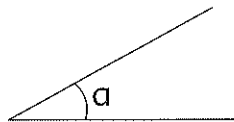
Step 3: Join HG .



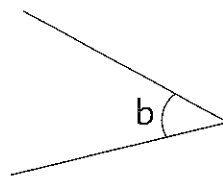
Exercise 1 : Measuring Angles

1. Estimate and then measure the marked angles.

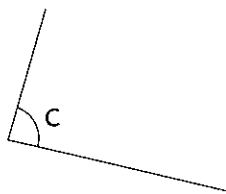
(a)



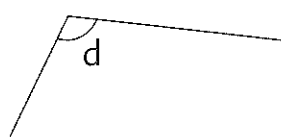
(b)



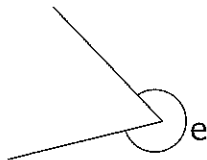
(c)



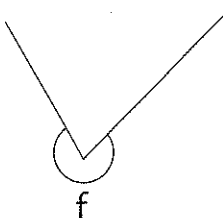
(d)



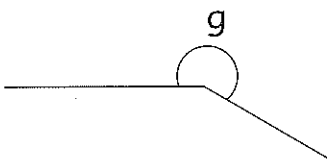
(e)



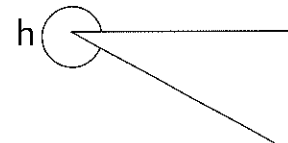
(f)



(g)



(h)

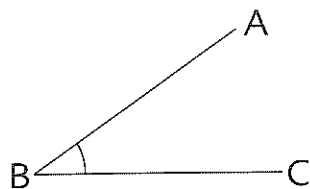


(a) (b) (c) (d) (e) (f) (g) (h)

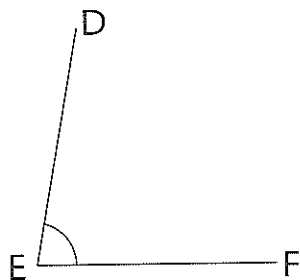
Angles	a	b	c	d	e	f	g	h
Estimate								
Measure								

2. Measure the given angles.

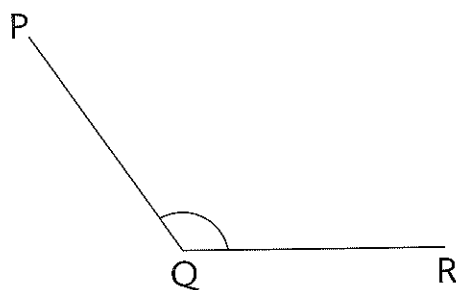
(a)



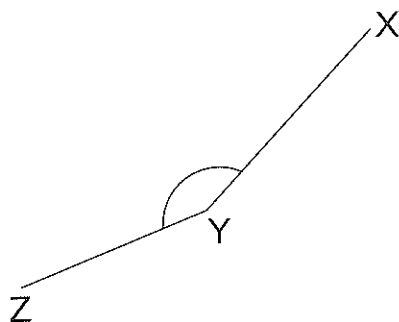
(b)



(c)

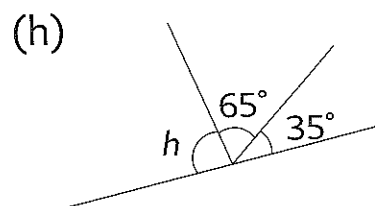
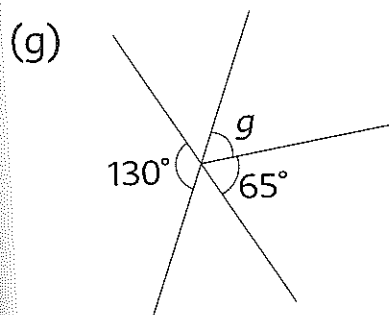
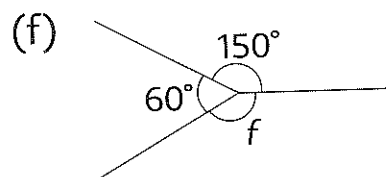
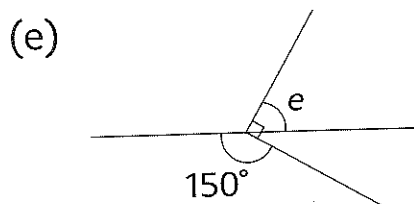
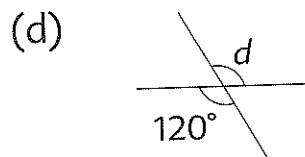
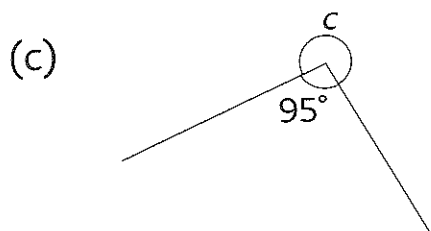
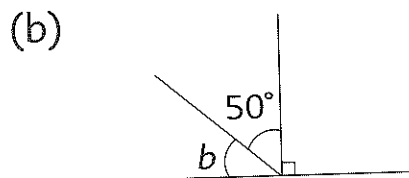
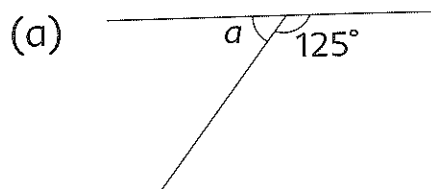


(d)



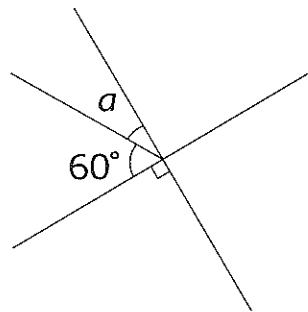
Exercise 2 : Finding Unknown Angles

1. The following figures are not drawn to scale. Find the unknown marked angles.

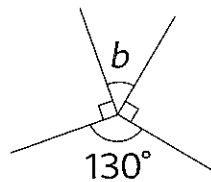


2. The following figures are not drawn to scale. Find the unknown marked angle in each figure.

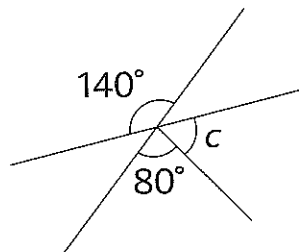
(a)



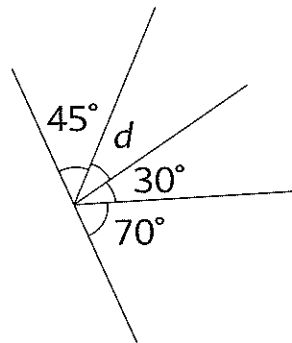
(b)



(c)



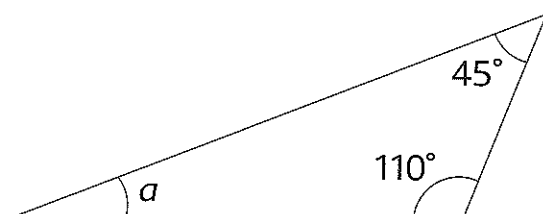
(d)



Exercise 3 : Sum of Angles of a Triangle

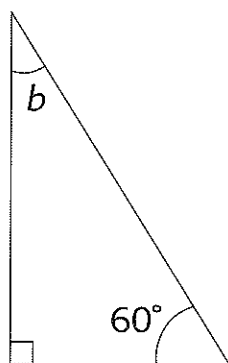
1. The following figures are not drawn to scale. Find the unknown marked angles.

(a)



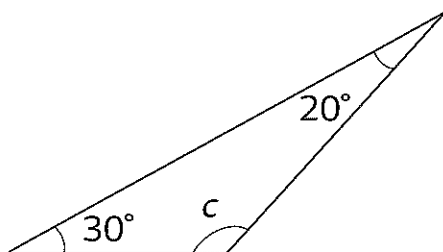
$\angle a =$

(b)

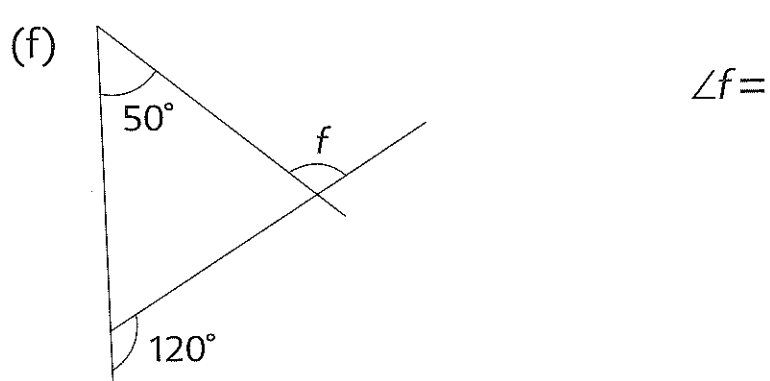
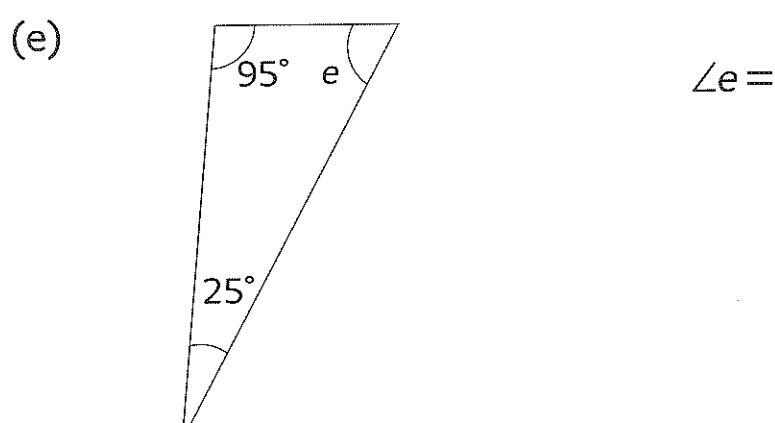
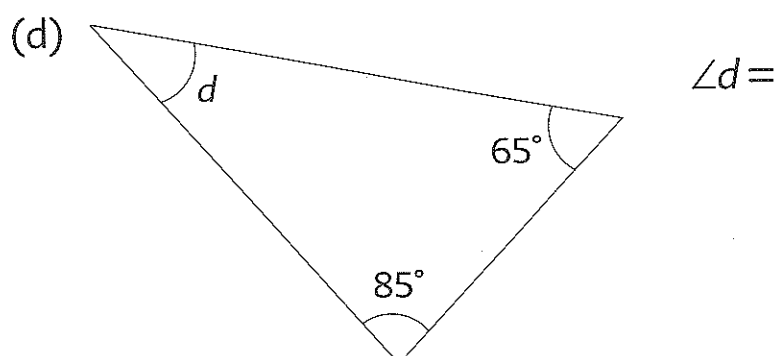


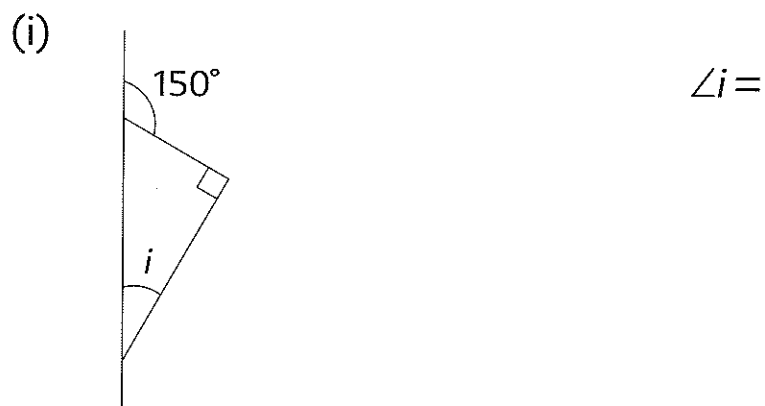
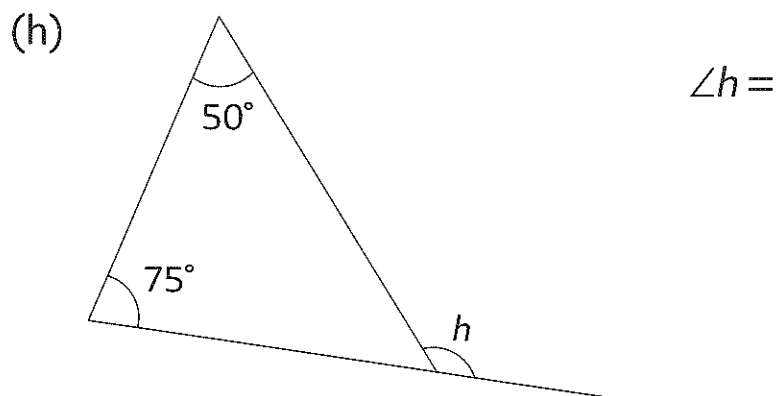
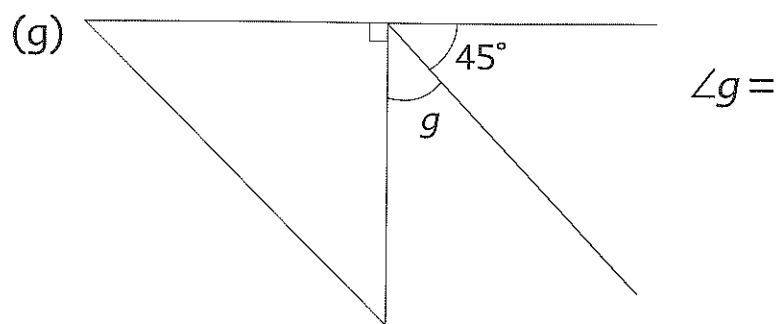
$\angle b =$

(c)



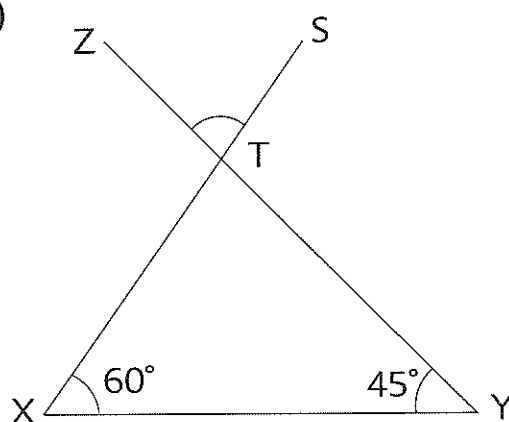
$\angle c =$





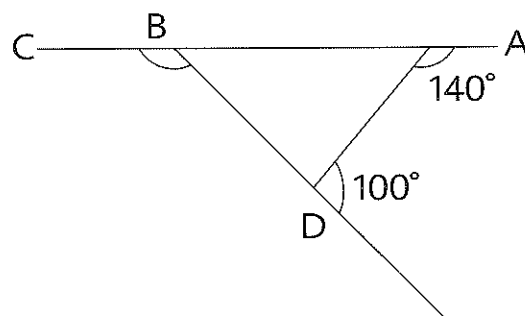
2. The following figures are not drawn to scale.
Find the unknown marked angles.

(a)



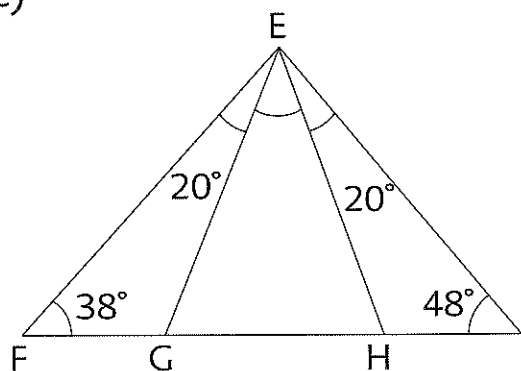
Find $\angle STZ$.

(b)



Find $\angle DBC$.

(c)

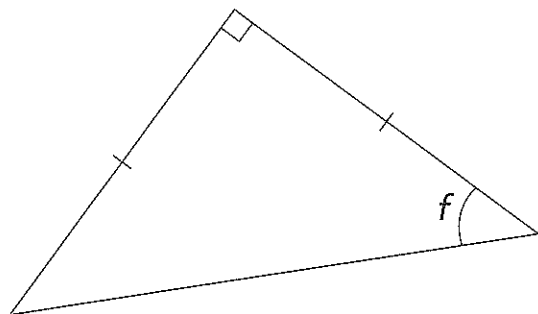


Find $\angle GEH$.

Exercise 4 : Isosceles and Equilateral Triangles

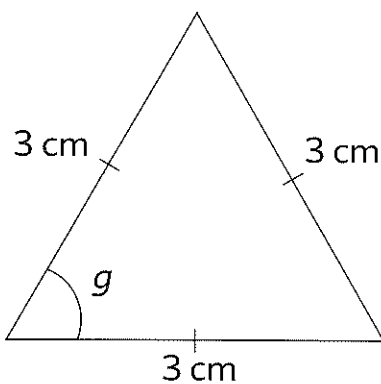
1. The following figures are not drawn to scale. Find the unknown marked angle in each figure.

(a)



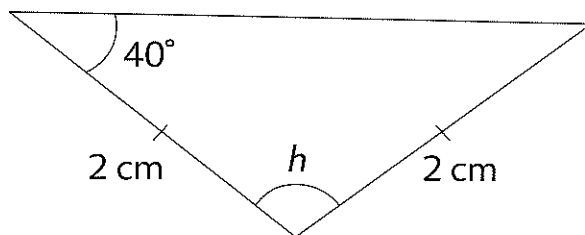
$\angle f =$

(b)



$\angle g =$

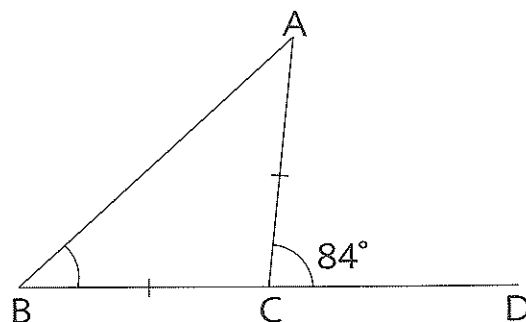
(c)



$\angle h =$

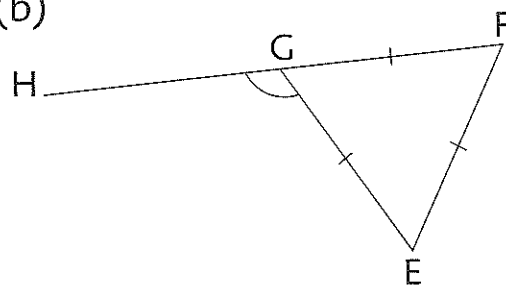
2. The following figures are not drawn to scale. Find the unknown marked angles.

(a)



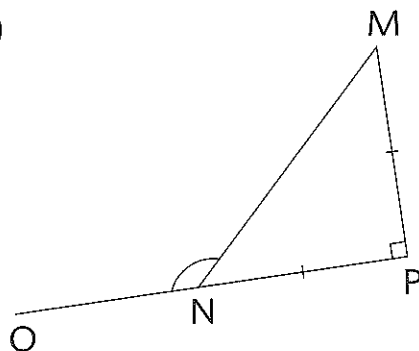
$$\angle ABC =$$

(b)



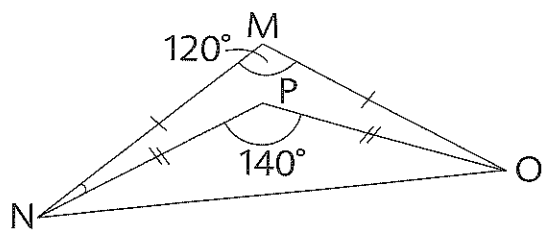
$$\angle HGE =$$

(c)



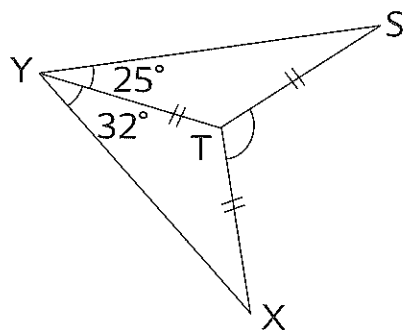
$$\angle MNO =$$

(d)



$\angle MNP =$

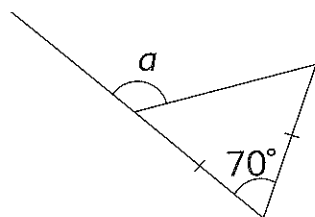
(e)



$\angle STX =$

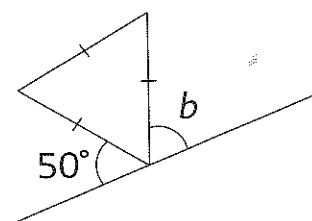
3. The following figures are not drawn to scale. Find the unknown marked angle in each figure.

(a)



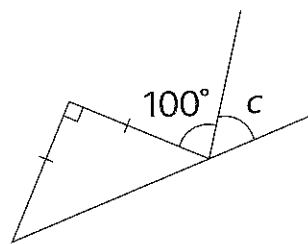
$$\angle a =$$

(b)



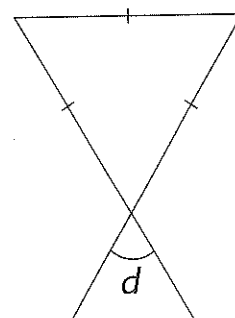
$$\angle b =$$

(c)



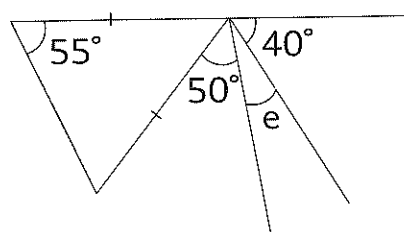
$$\angle c =$$

(d)



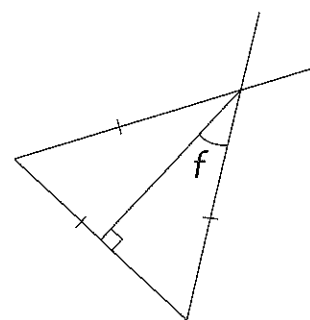
$$\angle d =$$

(e)



$$\angle e =$$

(f)



$$\angle f =$$

Exercise 5 : Drawing Triangles

1. Draw a triangle ABC in which $AB = 8\text{ cm}$, $BC = 4\text{ cm}$ and $\angle ABC = 100^\circ$.
2. Draw a triangle XYZ in which $YZ = 5\text{ cm}$, $XZ = 3\text{ cm}$ and $\angle XZY = 35^\circ$.

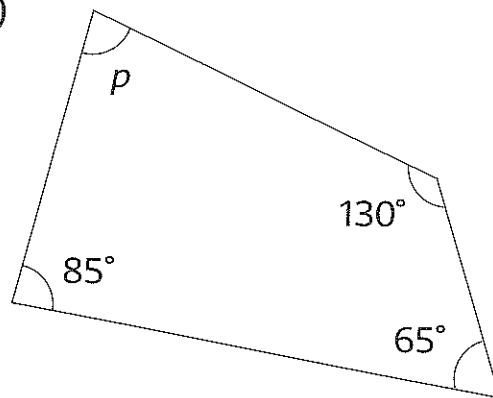
3. Draw a triangle DEF in which $\angle EDF = 70^\circ$, $\angle DFE = 40^\circ$ and $DF = 9$ cm.

4. Draw a triangle PQR, in which $QR = 6$ cm, $PR = 10$ cm and $\angle PQR = 90^\circ$.

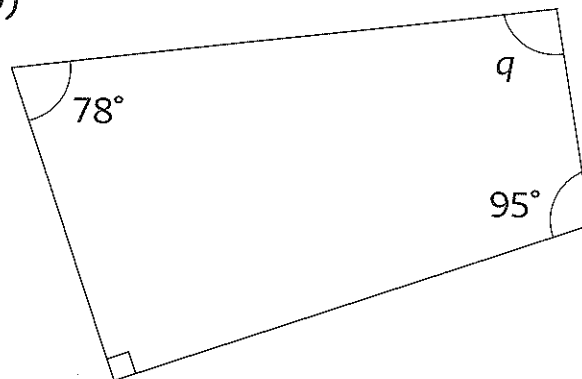
Exercise 6 : Sum of Angles of a Quadrilateral

1. The following figures are not drawn to scale. Find the unknown angles marked in each quadrilateral.

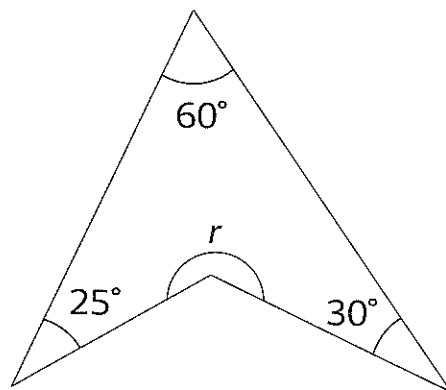
(a)



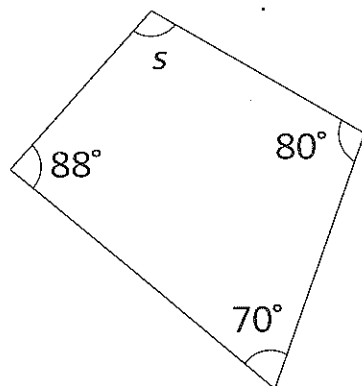
(b)



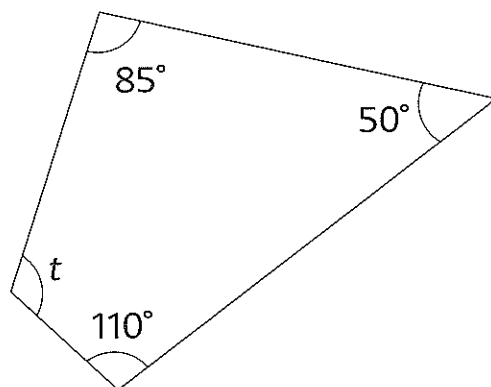
(c)



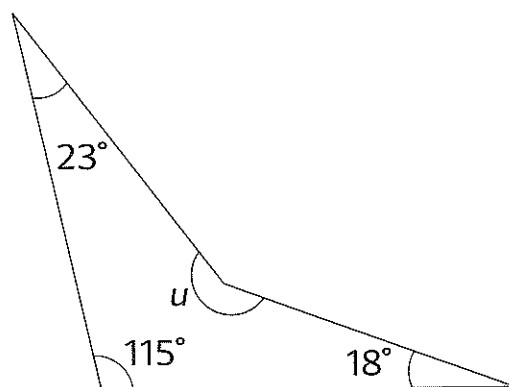
(d)



(e)



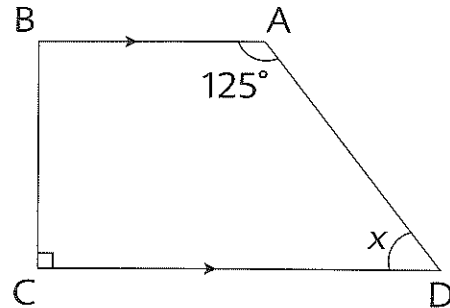
(f)



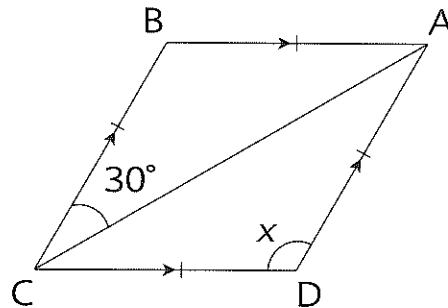
Exercise 7 : Parallelograms, Rhombuses and Trapezoids

1. The following figures are not drawn to scale. Find the unknown marked angles.

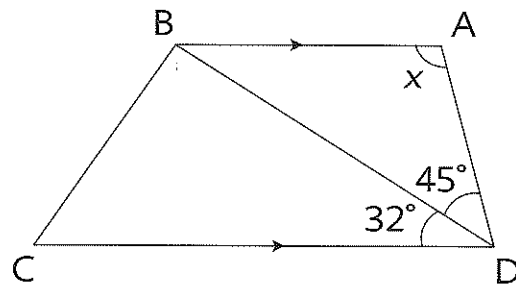
- (a) ABCD is a trapezoid. Find $\angle x$.



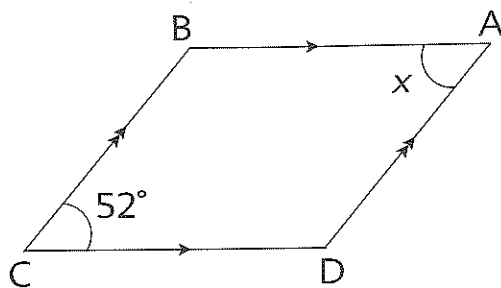
- (b) ABCD is a rhombus. Find $\angle x$.



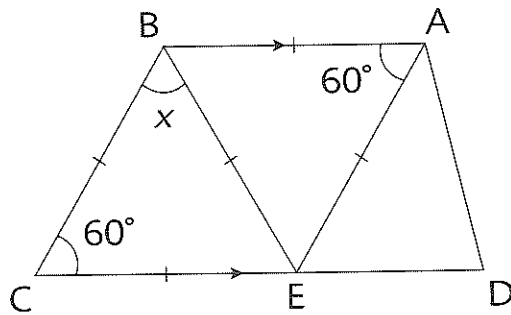
- (c) ABCD is a trapezoid. Find $\angle x$.



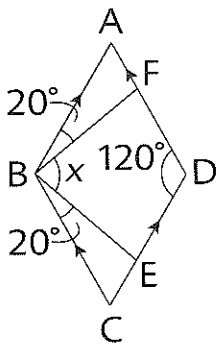
- (d) ABCD is a parallelogram. Find $\angle x$.



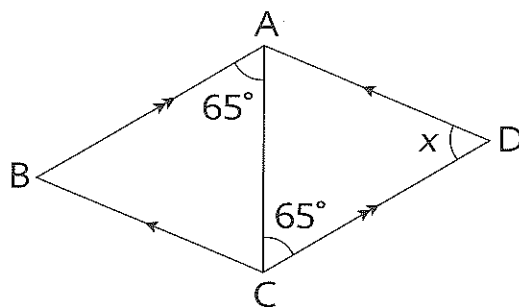
- (e) ABCD is a trapezoid. Find $\angle x$.



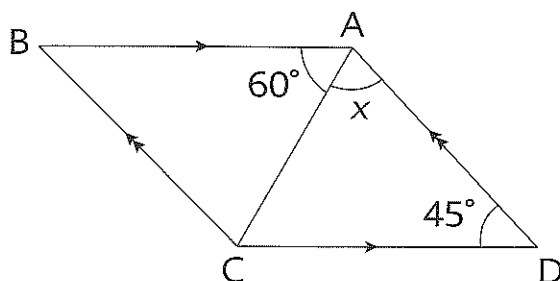
- (f) ABCD is a rhombus. Find $\angle x$.



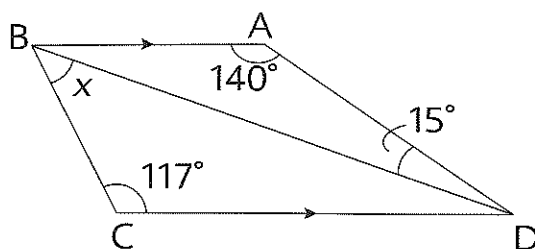
- (g) ABCD is a rhombus. Find $\angle x$.



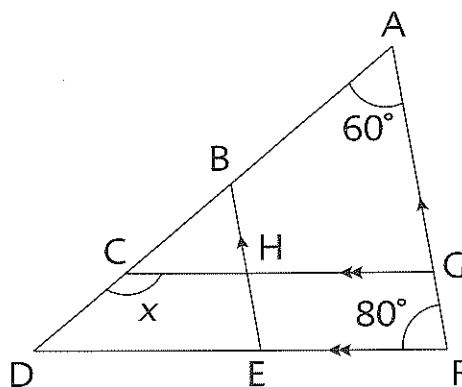
- (h) ABCD is a parallelogram. Find $\angle x$.



- (i) ABCD is a trapezoid. Find $\angle x$.



- (j) ABEF and CDFG are trapezoids.
Find $\angle x$.



Exercise 8 : Drawing Parallelograms and Rhombuses

1. Draw a parallelogram MNOP in which $MN = 6\text{ cm}$, $MP = 4\text{ cm}$ and $\angle MNO = 50^\circ$.

2. Draw a parallelogram PQRS in which $\angle PSR = 120^\circ$, $PS = 5\text{ cm}$ and $SR = 3\text{ cm}$.

3. Draw a rhombus WXYZ in which $XY = 7 \text{ cm}$
and $\angle WXY = 145^\circ$.

4. Draw a rhombus ABCD in which $BC = 5.5 \text{ cm}$
and $\angle DCB = 48^\circ$.

Unit 11 : Average and Rate

Friendly Notes

Average

We find the **average** by dividing the total quantity by the number of units.

1. The height of 5 girls is 1.4 m, 1.44 m, 1.48 m, 1.52 m and 1.56 m. Find the average height of the 5 girls.

$$\begin{aligned}\text{Total height} &= 1.4 + 1.44 + 1.48 + 1.52 + 1.56 \\ &= 7.4 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{Average height} &= \frac{\text{Total height}}{\text{Number of girls}} \\ &= \frac{7.4}{5} \\ &= 1.48 \text{ m}\end{aligned}$$

2. Mary's average score for 3 subjects is 78. If Mary got 62 for English and 89 for Mathematics, find her score for Science.

$$\begin{aligned}\text{Total score} &= 78 \times 3 \\ &= 234\end{aligned}$$

$$\begin{aligned}\text{Score for Science} &= 234 - 62 - 89 \\ &= 83\end{aligned}$$

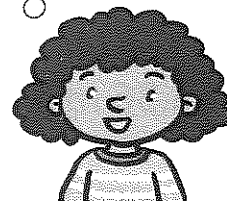
Rate

A rate involves two quantities. We usually give rate as one quantity per unit of another quantity.

1. Water flows from a tap at a rate of 25 liters per minute. How much water would have flowed from the tap in 5 minutes?

$$25 \times 5 = 125$$

25 ℓ in 1 min
 25×5 ℓ in 5 min



125 ℓ of water would have flowed from the tap in 5 minutes.

2. Rashida counted that her heart beats 234 times in 3 minutes. What is the rate of her heartbeat?

$$234 \div 3 = 78$$

234 times in 3 min
 $\frac{234}{3}$ times in 1 min



Exercise 1 : Average

1. Find the average of each of the following.

(a) 14, 16 and 30

(b) 24 kg, 38 kg and 34 kg

(c) 12, 29, 31 and 40

(d) \$1.70, \$3.65 and \$3.80

(e) 4.52 m, 5 m, 8.96 m and 24.8 m

2. Do these. Show all your work clearly.

(a) The total weight of 4 men and 2 women is 348 kg.
What is their average weight?

(b) Ruth took 11 min 20 s to solve 5 problems. On the
average, how long did she take to solve 1 problem?

8 kg.

- (c) A salesman used 15 ℓ 300 ml of gas in 4 days. What was the average amount of gas he used per day?

in the
item?

- (d) The table shows Betty's test scores for 4 subjects. Find her average score.

English	70
History	85
Mathematics	68
Science	79

(e) Mother cooked a total of 3 kg 530 g of rice from Monday to Wednesday. She cooked 4 kg 570 g from Thursday to Saturday. On average, how much rice did she cook per day?

(f) The sum of 4 numbers is 1230. The average of 3 of them is 293. What is the fourth number?

Exercise 2 : Rate

1. Fill in the blanks.

(a) Jerome took 20 days to finish reading a book of 300 pages. The rate is _____ pages per day.

(b) A wheel makes 45 revolutions per minute.

At this rate, it will make _____ revolutions in half an hour.

(c) David paints 30 Christmas cards in 5 days.

(i) The rate is _____ cards per day.

(ii) At this rate, he can paint _____ cards in 3 days.

(iii) He can paint 54 cards in _____ days.

2. Do these. Show all your work clearly.

(a) May writes 30 words in 5 minutes. If she continues writing at the same rate, how many words can she write in 8 minutes?

- (b) Half a dozen cartons of milk cost \$12. I have \$18. How many cartons of milk can I buy?
- (c) If 160 ml of orange juice can fill 8 bottles of the same capacity, how many bottles can be filled with 240 ml of orange juice?
- (d) At a parking complex, the parking fee is \$1.20 for the first hour and \$0.80 for every additional half hour. How much is the parking fee for 2 hours 30 minutes?
- (e) Find the cost of paving a rectangular area measuring 4 m by 10 m at \$11.30 per square meter.

18. How

- (f) Two faucets deliver water to a pool. Faucet A delivers 28.5 gallons of water in 3 minutes. Faucet B delivers 13.5 gallons of water in 4 minutes. If both the faucets are turned on, how much water do they deliver altogether in 10 minutes?

the same
240 ml

for the
hour. How

- (g) The rental rates of a holiday chalet are as follows.

Weekdays	\$60 per day
Saturdays and Sundays	\$80 per day

Randy rented a chalet for a few days, including a Saturday and a Sunday. If he paid \$400 altogether in rental, how many weekdays did he rent the chalet for?

uring

- (h) The rate charged by a transport company is 25 cents per kg per km. How much does the company charge to transport 100 kg of goods for 30 km?

- (i) In a city, the rates for taxi fares are as follows.

For the first km	\$2.60
For every additional km	\$0.40

Mr. Li pays \$3.80 for a journey by taxi. How long is his journey?

Unit 12 : Data Analysis

Friendly Notes

Mean, Median and Mode

In a given set of data, the **mean** is the average value of the data which is obtained by dividing the sum of the values of the data by the number of values.

1. Find the mean shoe size of 7 ladies given the following set of data.

5, 6, 8, 8, 8, 7, 7

$$\text{Mean} = \frac{\text{sum of shoe sizes}}{\text{number of shoe sizes}}$$

$$= \frac{5 + 6 + 8 + 8 + 8 + 7 + 7}{7}$$

$$= \frac{49}{7}$$

$$= 7$$

In a given set of data, the **median** is the middle value when the values are ranked from the least to the greatest or the mean of the two middle values when the set of data has two middle values.

2. Find the median age of 9 boys given the following set of data.

14, 13, 11, 14, 14, 13, 12, 10, 10

Make a list of the ages in increasing order.
10, 10, 11, 12, 13, 13, 14, 14, 14

The middle value is 13.

So, the median is 13.

3. Find the median mass of 6 children given the following set of data.

42, 44, 43, 40, 40, 45

Make a list of the ages in increasing order.
40, 40, 42, 43, 44, 45

The middle two values are 42 and 43.

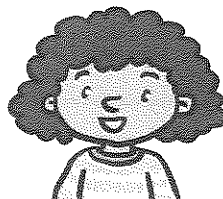
$$\begin{aligned}\text{Median} &= \frac{42 + 43}{2} \\ &= \frac{85}{2} \\ &= 42.5 \text{ kg}\end{aligned}$$

In a given set of data, the **mode** is the value or quantity that occurs the most often.

4. The data shows the number of children in each family recorded in a survey. Find the mode.

1, 2, 4, 3, 3, 1, 1, 1, 1, 0, 2, 2

The number 1 occurs the most often.



The mode is 1 child.

Histograms

We can use a **histogram** to represent grouped data with class intervals.

The height, in cm, of 20 students is shown below.

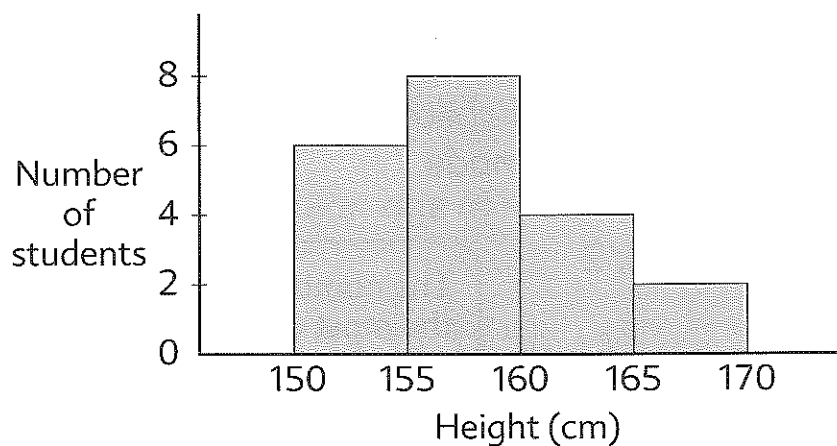
164 151 151 153 164 154 158 158 154 162 159 168
156 155 155 152 156 168 160 163

Height (cm)	Number of students
150 to 154	6
155 to 160	8
161 to 164	4
165 to 170	2

We can group the data in intervals as shown.



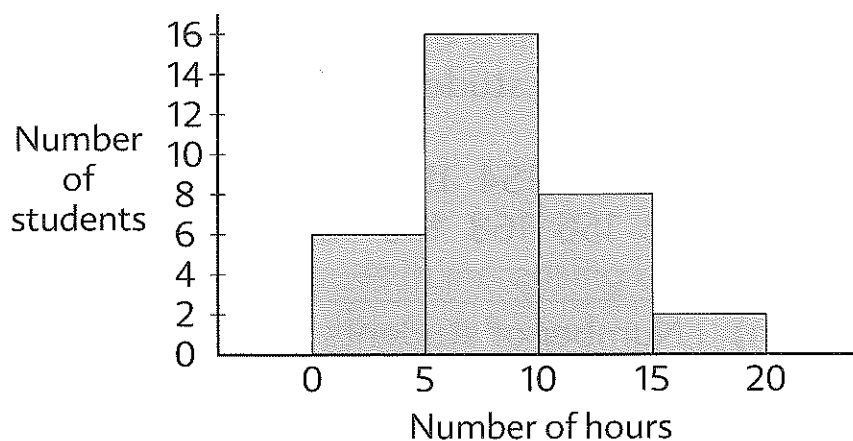
The grouped data can then be shown on a histogram.



The interval from 150 to 155 includes numbers from 150 to 154 only.



The histogram below shows the number of hours the students in a class spend studying in a week.



(a) $6 + 16 + 8 + 2 = 32$

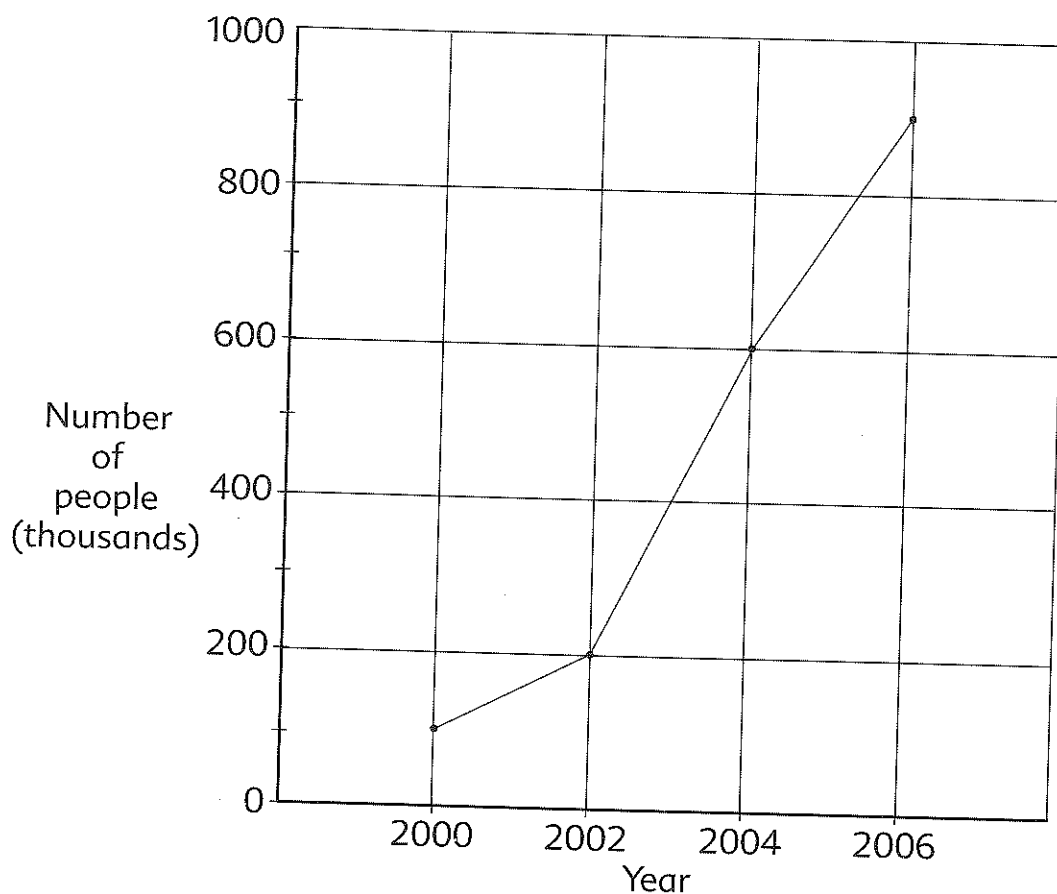
The total number of students in the class is 32.

(b) The mode number of hours is represented by the interval 5 to 10.

Line Graphs

Line graphs are used to represent data which changes over time.

The line graph shows the estimated number of people who own a cell phone in a city in the years from 2000 to 2006.



The greatest increase in the number of people who own a cell phone is between 2002 and 2004.

$$900,000 - 100,000 = 800,000$$

The increase in the number of people who own a cell phone from 2000 to 2006 is 800,000.

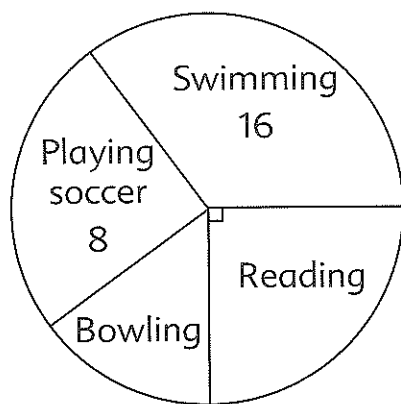
Pie Charts

Pie charts are used to display and compare the sizes of parts that make up a whole.

We can easily see the relative size of a part to a whole in a pie chart.

A pie chart is a circle graph.

The pie chart shows the favorite hobbies of the students in a class. There are 40 students in the class.



Reading is represented by a quarter circle.



$\frac{1}{4}$ of the students in the class like reading.

The greatest portion of the chart is represented by swimming.



Most students like swimming.

$$\frac{8}{40} \times 100\% = 20\%$$

20% of the students like playing soccer.

Exercise 1 : Mean, Median and Mode

1. The score the students obtained in a test out of 100 is shown below.

82	60	62	63	78	75	86	75	91	46	58	64	65	80
81	65	85	86	63	63	64	66	70	66	85	85	65	65
66	70												

- (a) Find the mean score.
- (b) Find the median score.
- (c) Find the mode score.

2. The grades of 40 students in a music examination are shown below.

B	C	C	C	A	A	A	D	A	C	A	D	C	C	B	B
B	E	E	A	A	D	A	B	A	C	B	D	C	A	D	E
C	D	C	B	B	A	B	A								

(a) Find the mode grade.

(b) Find the median grade.

3. The number of hours 20 students spend surfing the Internet per day is shown below.

5.5	6	6	10	10.5	11	8.5	9	10	9	8.5	6
7.5	7	7	4	3	4.5	6	6.5				

(a) Find the mean number of hours.

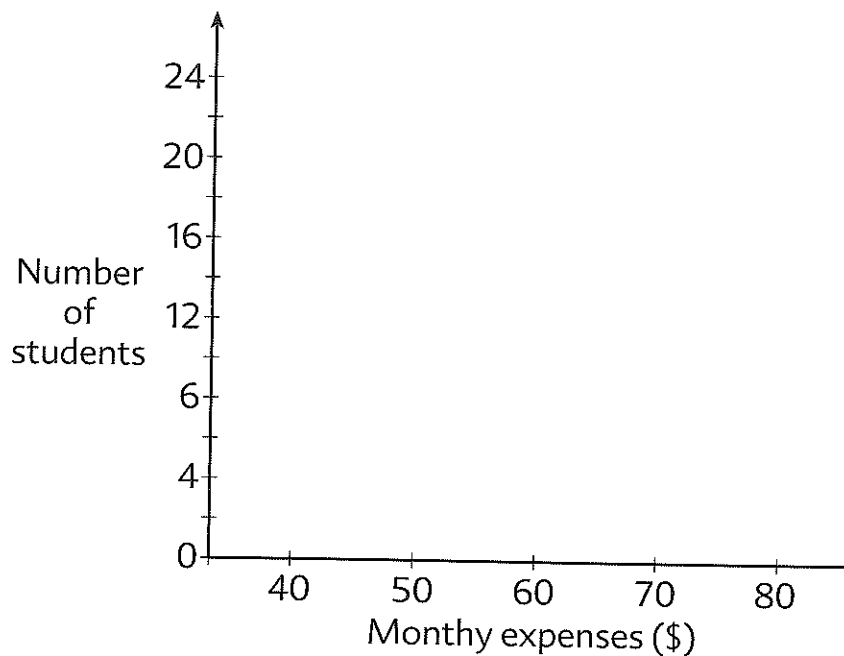
(b) Find the median number of hours.

Exercise 2 : Histograms

1. The table shows the monthly expenses of the students in a class.

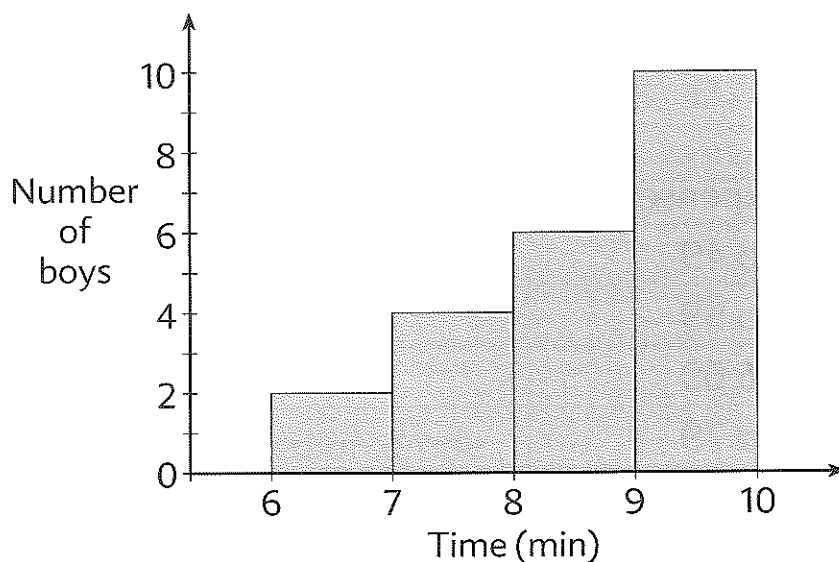
Monthly expenses (\$)	Number of students
40 to 49	8
50 to 59	20
60 to 69	16
70 to 79	4

- (a) Draw a histogram to represent the data.



- (b) Find the percentage of students who spend less than \$50 monthly.

2. The histogram shows the time taken by the boys in a class to run 2.4 km.



- (a) What is the total number of boys represented in the histogram?

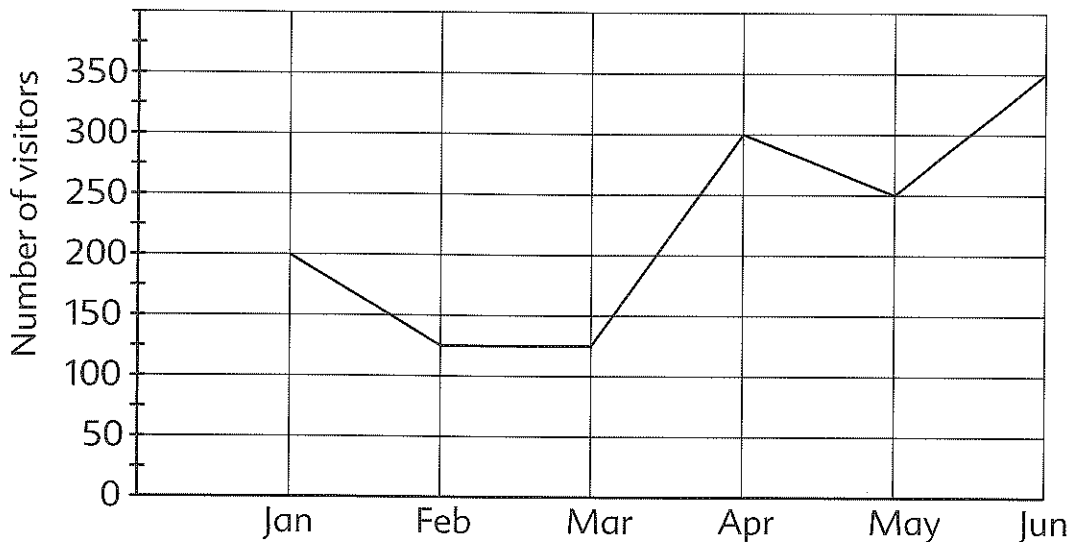
- (b) How many boys took at least 7 minutes but less than 8 minutes to run 2.4 km?

- (c) Which interval represents the mode time of the boys?

- (d) What fraction of the boys took at least 8 minutes but less than 9 minutes to run 2.4 km?

Exercise 3 : Line Graphs

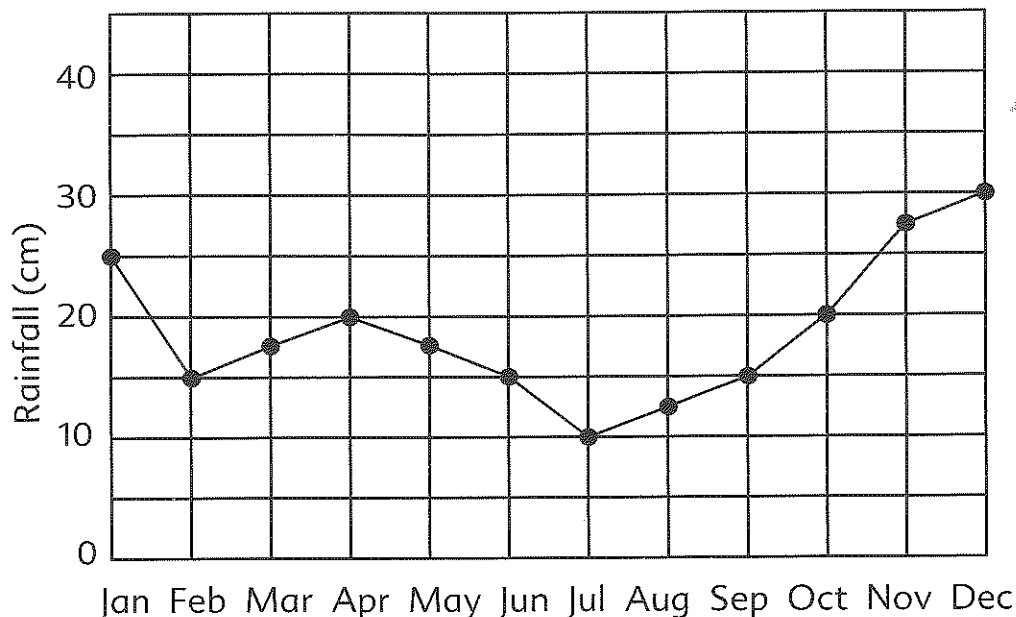
1. The line graph shows the number of visitors to a certain museum from January to June. Study the graph and answer the following questions.



- What was the total number of visitors for the six months? _____
- What was the difference between the number of visitors in January and the number of visitors in June?

- What was the increase in the number of visitors from March to April? _____
- From which month to which month did the number of visitors decrease from 300 to 250?
From _____ to _____
- What was the average number of visitors for April and May? _____

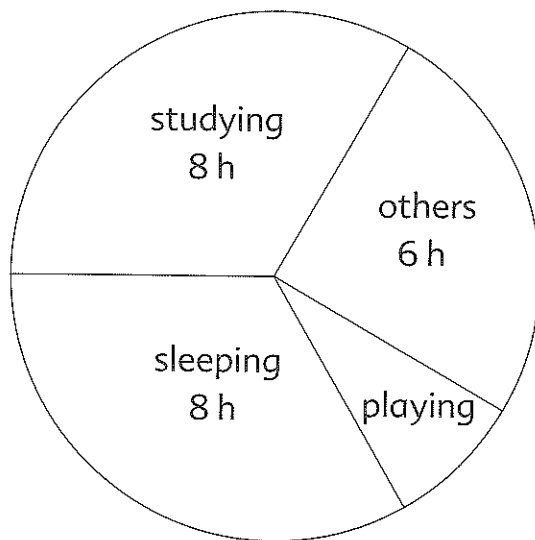
2. The line graph below shows the average monthly rainfall of a certain city from January to December last year. Study the graph and answer the following questions.



- (a) Which month had the most rainfall? _____
- (b) From which month to which month did the average monthly rainfall increase from 10 cm to 30 cm?
From _____ to _____
- (c) Which month had the same amount of average rainfall as October? _____
- (d) What was the decrease in the average rainfall from April to July? _____
- (e) What was the ratio of the average monthly rainfall in July to the average monthly rainfall in December?

Exercise 4 : Pie Charts

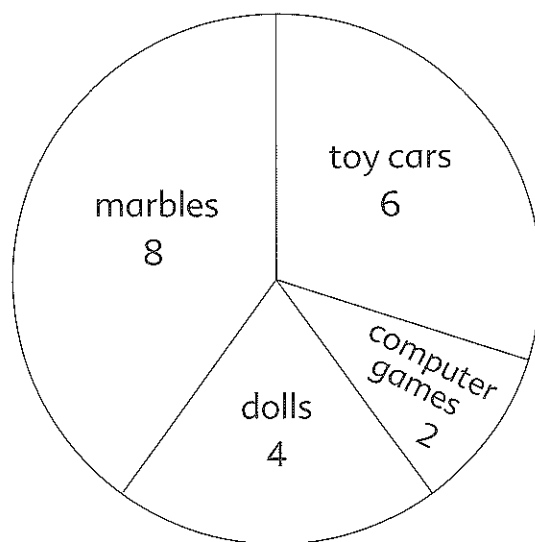
1. The pie chart below shows how Lena spent her time yesterday.



- (a) What fraction of Lena's time was spent studying?

- (b) What percentage of her time was spent on other activities ('others')? _____%
- (c) How many hours did she spend playing? _____h
- (d) What is the ratio of the time spent sleeping to the time spent playing? _____
- (e) What percentage of her time was **not** spent studying?
_____%

2. The pie chart below shows the number of toys in a toy box.



(a) How many toys are there altogether in the toy box?

(b) What percentage of the toys are computer games?

_____%

(c) What fraction of the toys are marbles?

(d) Express the number of dolls as a percentage of the number of toy cars. _____

(e) What is the ratio of the number of marbles to the number of computer games to the number of dolls?

3. The pie chart below shows the favorite types of books of a group of 40 students.



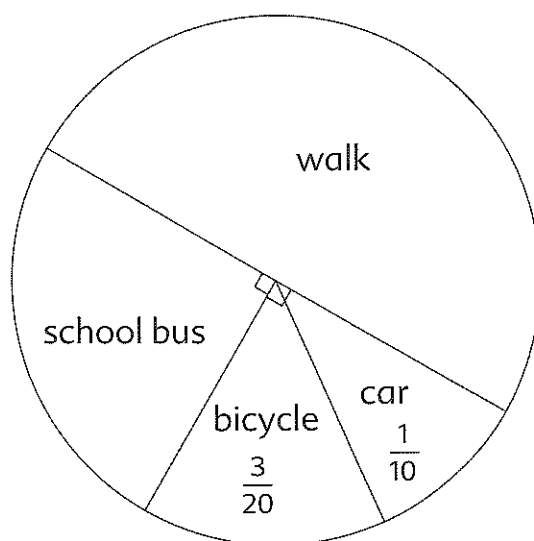
- (a) What fraction of the students like science fiction?

- (b) How many students like animal stories? _____
- (c) What types of books did most students like?

- (d) What percentage of the students like joke books?

- (e) What is the ratio of the students who like joke books to the total number of students?

4. The pie chart below shows how a group of 100 students go to school every day.



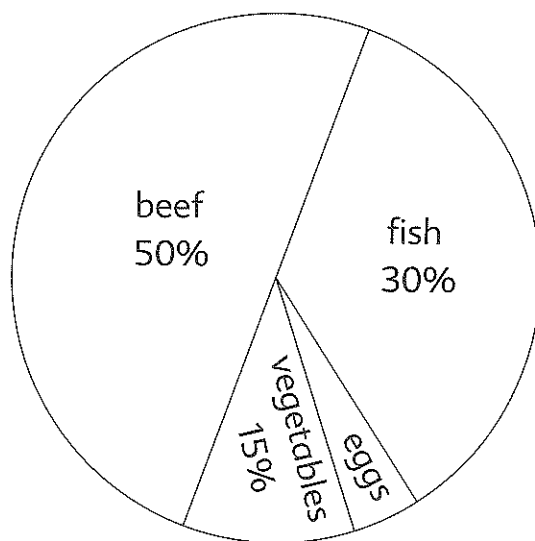
- (a) What fraction of the students walk to school?

- (b) What percentage of the students go to school by school bus? _____%
- (c) How many students go to school by car?

- (d) How many more students go to school by taking the school bus than by bicycling?

- (e) Find the ratio of the students who walk to school to those who go by car.

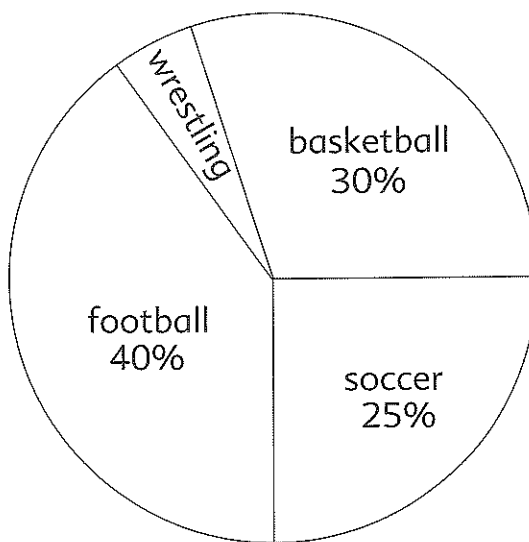
5. The pie chart below shows how Britney spent her money at the market last Sunday. She spent \$50 in all.



- (a) What percentage of Britney's money was spent on eggs? _____
- (b) How much did Britney spend on fish? _____
- (c) What fraction of Britney's money was spent on beef?

- (d) How much more did Britney spend on vegetables than on eggs? _____
- (e) What is the ratio of the amount spent on fish to the amount spent on beef? _____

6. The pie chart below shows the percentages of 800 students who played different sports.



- (a) How many did wrestling? _____
- (b) What fraction of the students did soccer?

- (c) Altogether, how many students did football or basketball? _____
- (d) There are _____ fewer students who did basketball than soccer.
- (e) The ratio of the number of students who did football to the number of students who did soccer to the number of students who did basketball is
_____.

Unit 13 : Algebra

Friendly Notes

Algebraic expressions

Letters can be used to represent unknown numbers.

Such letters are known as **variables**.

Expressions which contain variables are known as **algebraic expressions**.

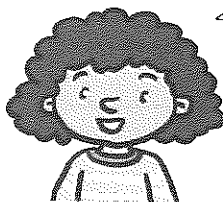
1. Tom is 12 years old. How old will he be after x years?

x stands for any whole number.



Tom's age after x years = $(12 + x)$ years

The algebraic expression $12 + x$ is the sum of 12 and x .



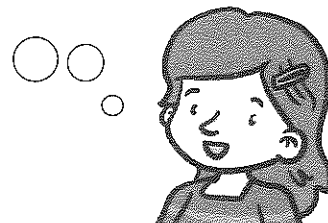
2. A clown has t balloons. He gave them equally to 9 children at a fun fair.
- (a) Express the number of balloons each child received in terms of t .
- (b) If $t = 36$, find the number of balloons each child received.

(a) Number of balloons each child received

$$= t \div 9$$

$$= \frac{t}{9}$$

We write $t \div 9$ as $\frac{t}{9}$.



(b) If $t = 36$, number of balloons each child received $= \frac{36}{9}$
 $= 4$

3. Simplify $3e + 7 + 5e - 2$.

$$3e + 7 + 5e - 2 = 8e + 5$$

$$\begin{aligned} 3e + 5e &= 8e \\ 7 - 2 &= 5 \end{aligned}$$

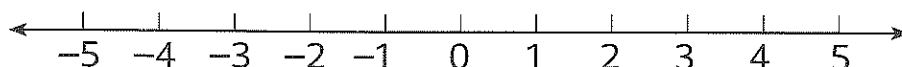


Integers

Negative numbers are used to represent numbers less than a starting number of 0.

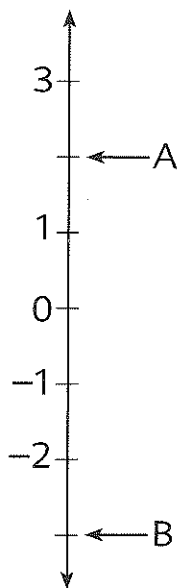
On a horizontal number line, **positive integers** start at 0 and count to the right. **Negative integers** start at 0 and count to the left. 0 is an integer, but it is neither negative nor positive.

1. Draw a number line to show the integers between -5 and 4 .



On a vertical number line, positive integers start at 0 and count up. Negative integers start at 0 and count down.

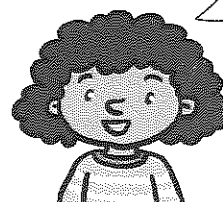
2. What number does each letter represent on the number line?



$$A = 2$$

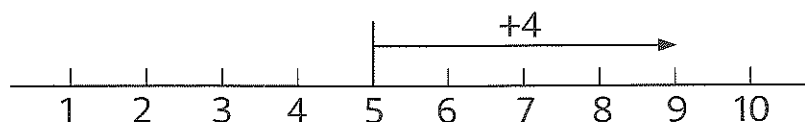
$$B = -3$$

On a number line, 3 and -3 are both the same distance from 0. Their numerical value is the same.



To add two positive integers, add their numerical values.
The result is positive.

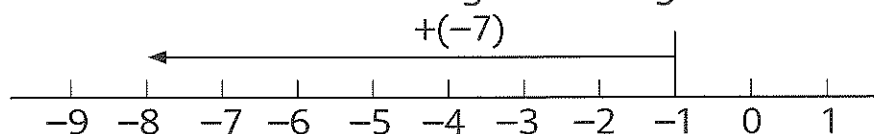
3. Use a number line to add positive integers 5 and 4.



$$5 + 4 = 9$$

To add two negative integers, add their numerical values.
The result is negative.

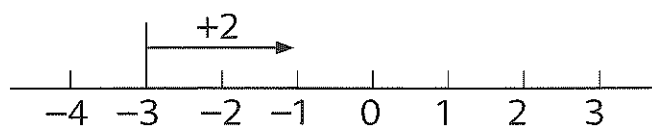
4. Use a number line to add negative integers -1 and -7 .



$$(-1) + (-7) = -8$$

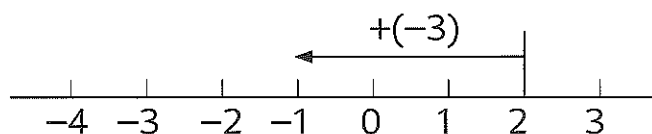
To add a positive and a negative integer, find the difference of their numerical values. If the number with the larger numerical value is positive, the result is positive. If the number with the larger numerical value is negative, the result is negative.

5. Use a number line to find the sum of -3 and 2.



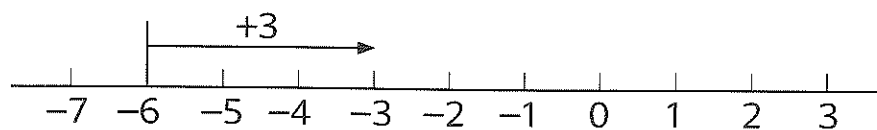
$$(-3) + 2 = -1$$

or



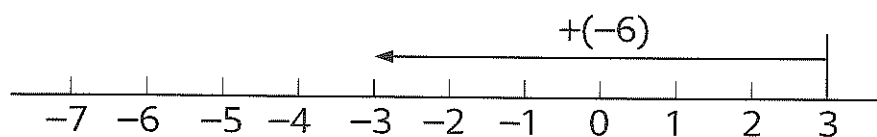
$$2 + (-3) = -1$$

6. Use a number line to find the sum of -6 and 3 .



$$(-6) + 3 = -3$$

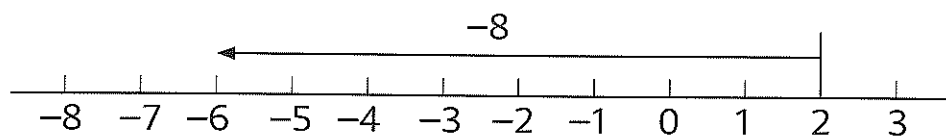
or



$$3 + (-6) = -3$$

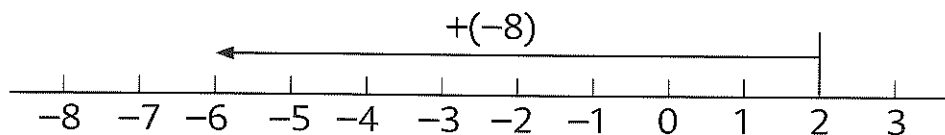
Subtracting a positive number is the same as adding a negative number.

7. Use a number line to subtract 8 from 2.



$$2 - 8 = -6$$

8. Add -8 to 2.



$$2 + (-8) = -6$$

Coordinate Graphs

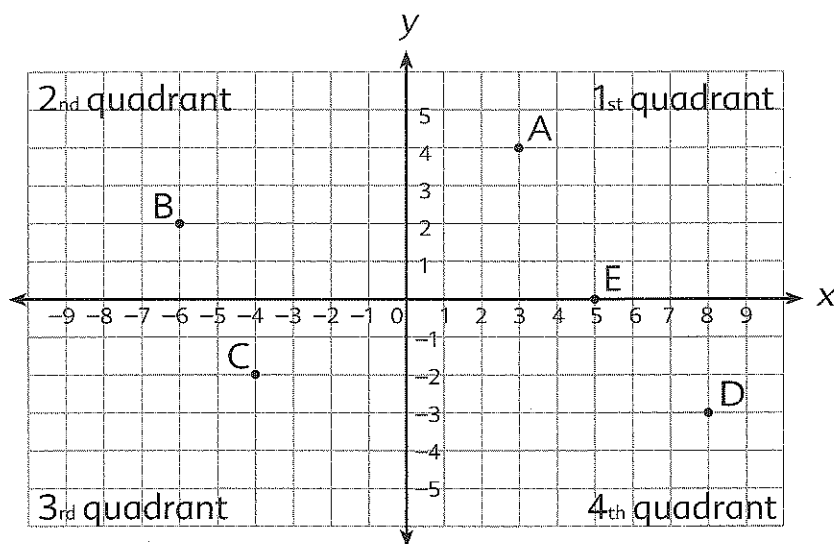
We can find any point on a graph by naming the **coordinates** of that point.

These coordinates are **ordered pairs** of numbers.

The first number in the pair indicates the location on the horizontal axis and the second number indicates the location on the vertical y-axis.

The point where the two axes cross is called the **origin**.

1. Find the coordinates of each point.



Coordinates of point A: (3, 4)

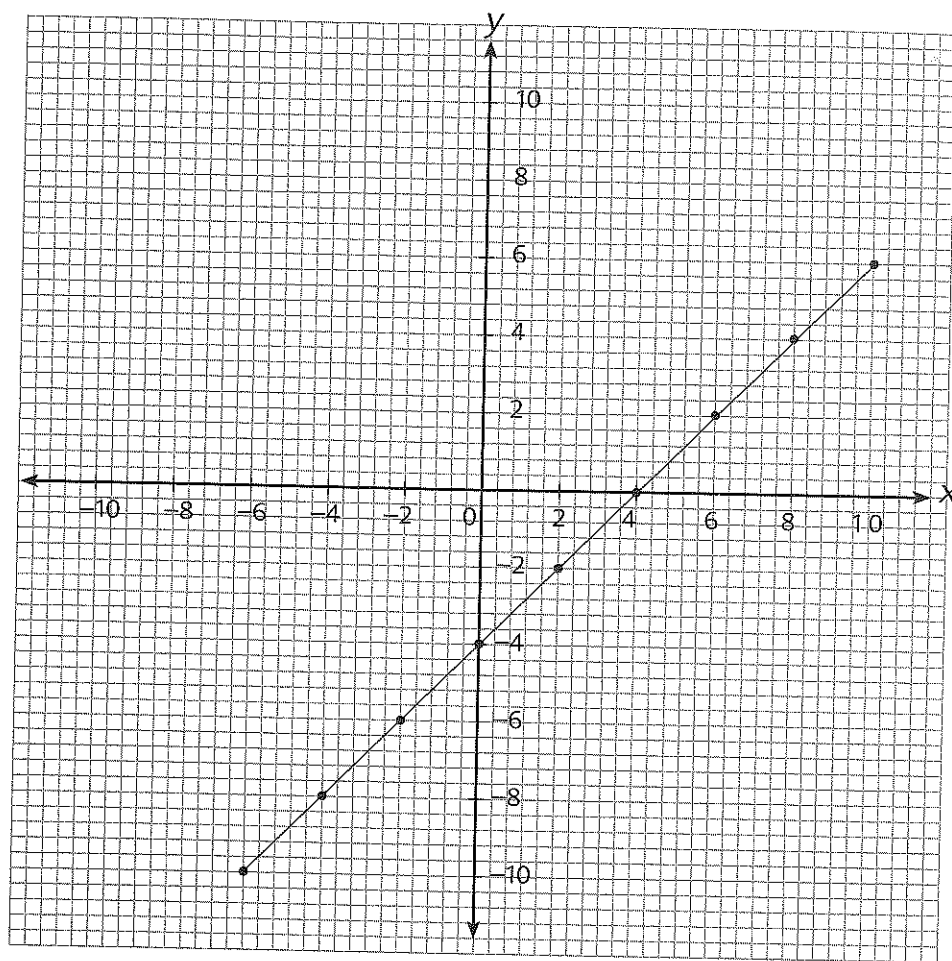
Coordinates of point B: (-6, 2)

Coordinates of point C: (-4, -2)

Coordinates of point D: (8, -3)

Coordinates of point E: (5, 0)

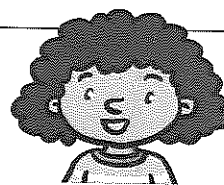
2. (a) Find the coordinates of y when $x = -2$ from the figure.
- (b) Write an equation showing the relationship between x and y .



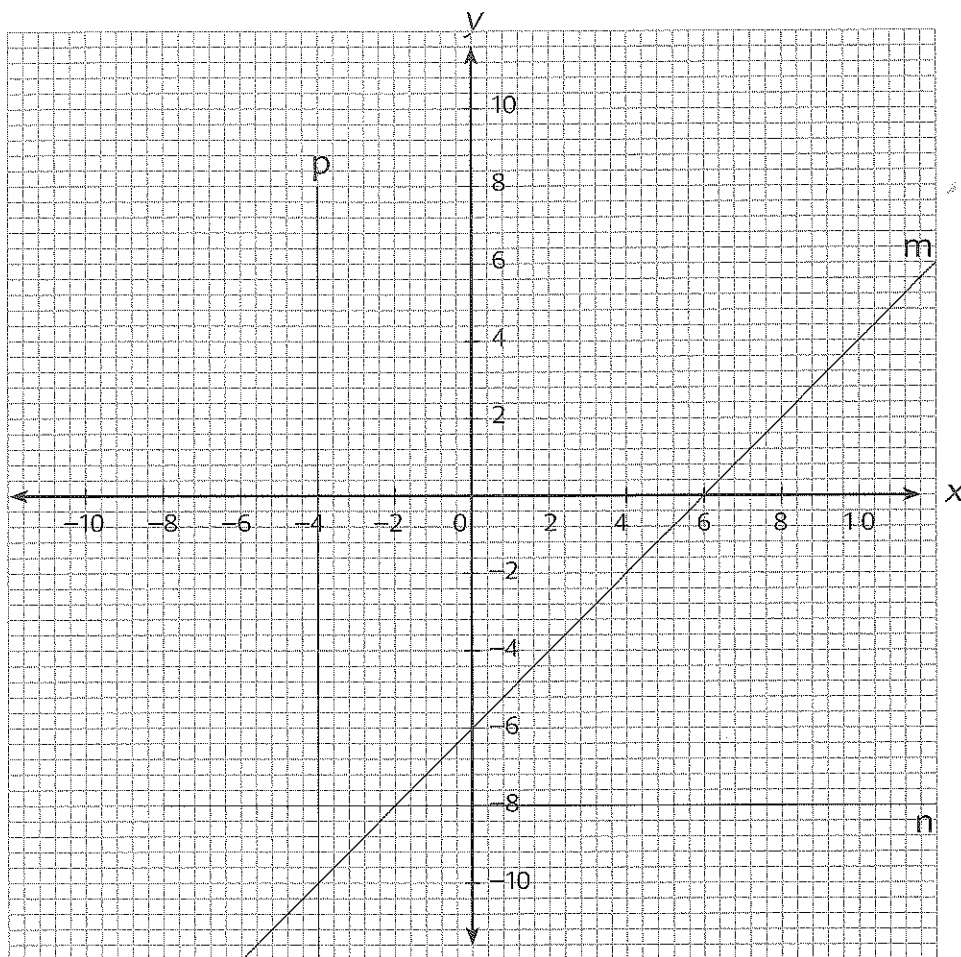
- (a) When $x = -2$, y is -6 .
- (b) The y -coordinate of each point is 4 less than the x -coordinate.

So, $y = x - 4$

The straight line passing through these ordered pairs is called the graph of the equation $y = x - 4$.



3. Study the graphs of lines m , n , p .



- (a) Give the coordinates of the intersection point of Lines m and n .
- (b) What is the x -coordinate of any point on Line p ?
- (c) What is the y -coordinate of any point on Line n ?

- (a) $(-2, -8)$
- (b) -4
- (c) -8

Exercise 1 : Algebraic Expressions

1. Do these. Show all your work clearly.
 - (a) Terry spent \$ x in one shop and \$53 in another shop.
 - (i) Express the total amount of money spent in terms of x .
 - (ii) If $x = 5$, find the total amount of money spent.
 - (ii) If $x = 10$, find the total amount of money spent.
 - (b) Leela had 24 lb of salt. She packed the salt into bags of n lb each.
 - (i) Express the number of bags she packed in terms of n .
 - (ii) If $n = 3$, find the number of bags she packed.
 - (iii) If $n = 4$, find the number of bags she packed.

- (c) Sally had \$ m . She spent \$2.50.
- (i) Express the amount of money she had left in terms of m .
 - (ii) If $m = 10$, find the amount of money she had left.
 - (iii) If $m = 5.5$, find the amount of money she had left.
- (d) A rectangle is k cm long and 5 cm wide.
- (i) Express the area of the rectangle in terms of k .
 - (ii) If $k = 8$, find the area of the rectangle.
 - (iii) If $k = 12$, find the area of the rectangle.

- (e) Ramli's monthly salary is \$ s . He spends \$1500 each month.
- (i) Express the amount of money he saves in a year in terms of s .
 - (ii) If $s = 2300$, find the amount of money he saves in a year.
 - (iii) If $s = 2800$, find the amount of money he saves in a year.
- (f) 5 tins of biscuits, of equal weight, together weigh n grams. Each empty tin weighs 100 grams.
- (i) Express the weight of the biscuits in each tin in terms of n .
 - (ii) If $n = 6500$, find the weight of the biscuits in each tin.
 - (iii) If $n = 9000$, find the weight of the biscuits in each tin.

2. Find the value of each of the following expressions when $m = 20$.

(a) $m - 13$ =	(b) $8 + m$ =
(c) $5m$ =	(d) $\frac{m}{4}$ =
(e) $\frac{80}{m}$ =	(f) $29 - m$ =
(g) $3m + 20$ =	(h) $50 - 2m + 15$ =

3. Find the value of each of the following expressions when $h = 10$.

(a) $6h - 15$ =	(b) $\frac{h}{2} + 30$ =
(c) $\frac{1+h}{11}$ =	(d) $\frac{3h}{h}$ =
(e) $5 + h^2$ =	(f) $2h^2 - 8$ =
(g) $h + \frac{h}{10}$ =	(h) $\frac{200}{h} - h$ =

4. Simplify each of the following expressions.

(a) $m + m$ =	(b) $n + n + n$ =
(c) $4p + 2p$ =	(d) $8q + q$ =
(e) $7b - 2b$ =	(f) $a + 9a + 2a$ =
(g) $10g + 3g - 6g$ =	(h) $4e - e + 5e$ =
(i) $8z + 2z - 5$ =	(j) $3t - 6 + 2t$ =
(k) $4f - 3f - 6$ =	(l) $7d + d + 1$ =
(m) $8 + a - 5 + a$ =	(n) $3h + 4 - h - 2$ =
(o) $6k + 6 + 2k - 6$ =	(p) $10 - 3r + 5 + 2r$ =

Exercise 2 : Integers

1. Fill in the blanks.

(a) If 50 m below sea level is represented by -50 ,
80 m above sea level is represented by _____.

(b) If 4 floors above the ground floor in a shopping center is
represented by $+4$, 2 floors below the ground floor
would be represented by _____.

2. (a) Draw a number line to show the integers between -10
and 3 .

(b) Draw a number line to show the integers greater than
 -2 but less than 6 .

3. Write $<$ or $>$ or $=$ in each \bigcirc .

(a) $8 \bigcirc -8$

(b) $-3 \bigcirc -7$

(c) $-4 \bigcirc 3$

(d) $21 \bigcirc -21$

(e) $-10 \bigcirc 5$

(f) $9 \bigcirc -3$

4. Fill in the blanks.

(a) The numerical value of -12 is _____.

(b) The numerical value of 16 is _____.

5. Find the value of each of the following.

(a) $(-8) + 11 =$ _____

(b) $(-6) + (-14) =$ _____

(c) $20 + (-4) =$ _____

(d) $0 + (-10) =$ _____

(e) $25 + (-20) =$ _____

(f) $(-42) + (-18) =$ _____

(g) $(-78) + 45 =$ _____

(h) $100 + (-55) =$ _____

6. Fill in the blanks.

(a) If $k = -3$, find the value of each of the following.

(i) $-7 + k =$ _____

(ii) $k + (-10) =$ _____

(b) If $m = -6$, find the value of each of the following.

(i) $m + 14 =$ _____

(ii) $34 + m =$ _____

7. Find the value of each of the following.

(a) $(-6) - (-8) =$ _____

(b) $30 - (-12) =$ _____

(c) $(-15) - 42 =$ _____

(d) $(-26) - (-24) =$ _____

(e) $65 - (-14) =$ _____

(f) $(-95) - 100 =$ _____

8. Fill in the blanks.

If $w = 10$, find the value of each of the following.

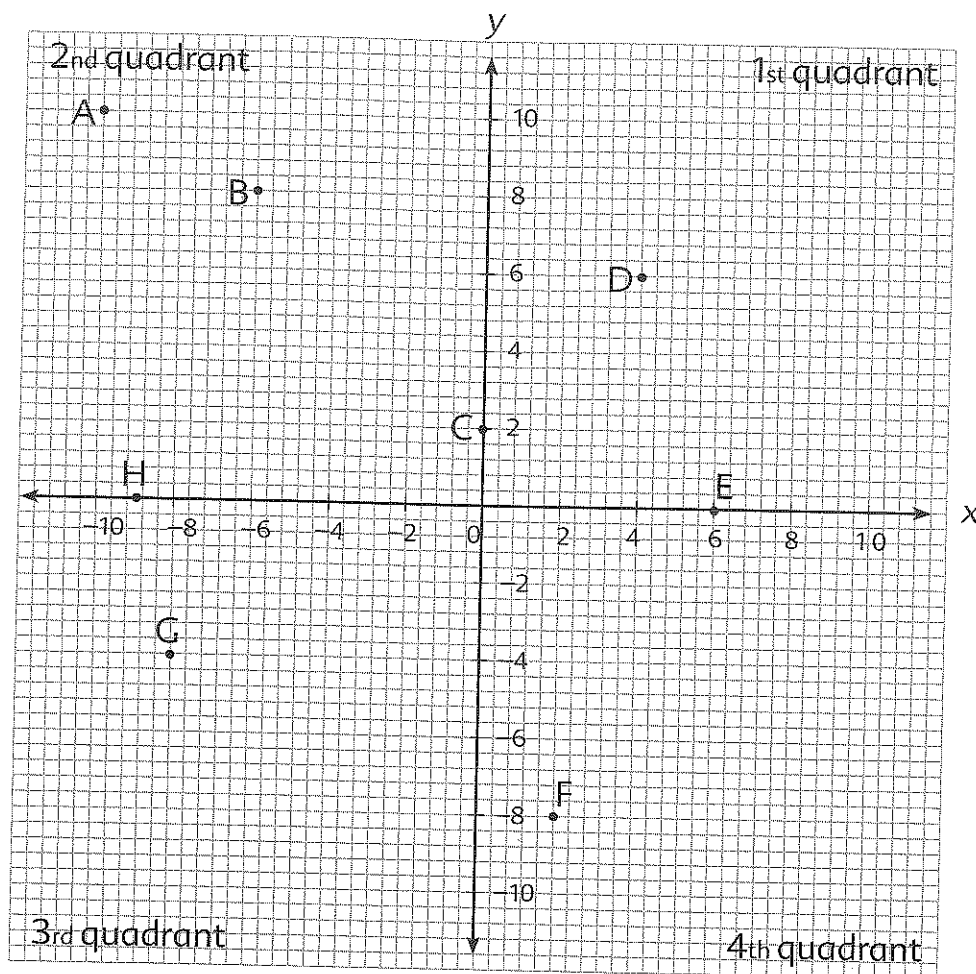
(a) $w - (-35) =$ _____

(b) $80 - w =$ _____

(c) $(-64) - w =$ _____

Exercise 3 : Coordinate Graphs

1. Write the coordinates of each point.



(a) A _____

(b) B _____

(c) C _____

(d) D _____

(e) E _____

(f) F _____

(g) G _____

(h) H _____

2. In which quadrant would each of the following points be located?

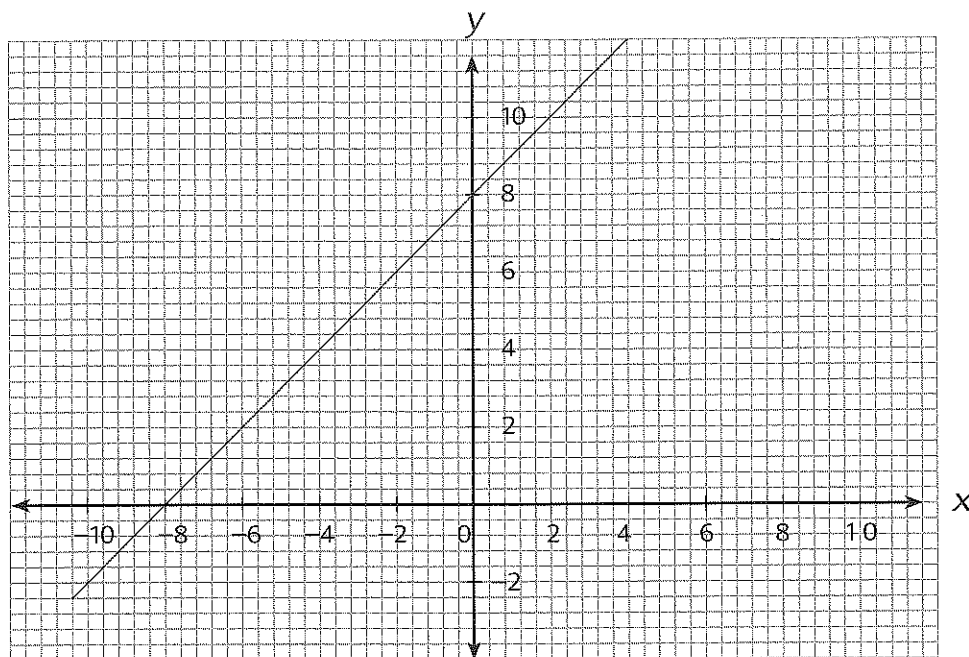
(a) $(4, 5)$ _____

(b) $(3, -7)$ _____

(c) $(-2, -3)$ _____

(d) $(-6, 1)$ _____

3. Fill in the blanks.



(a) When $x = -8$, y is _____.

(b) When $x = 2$, y is _____.

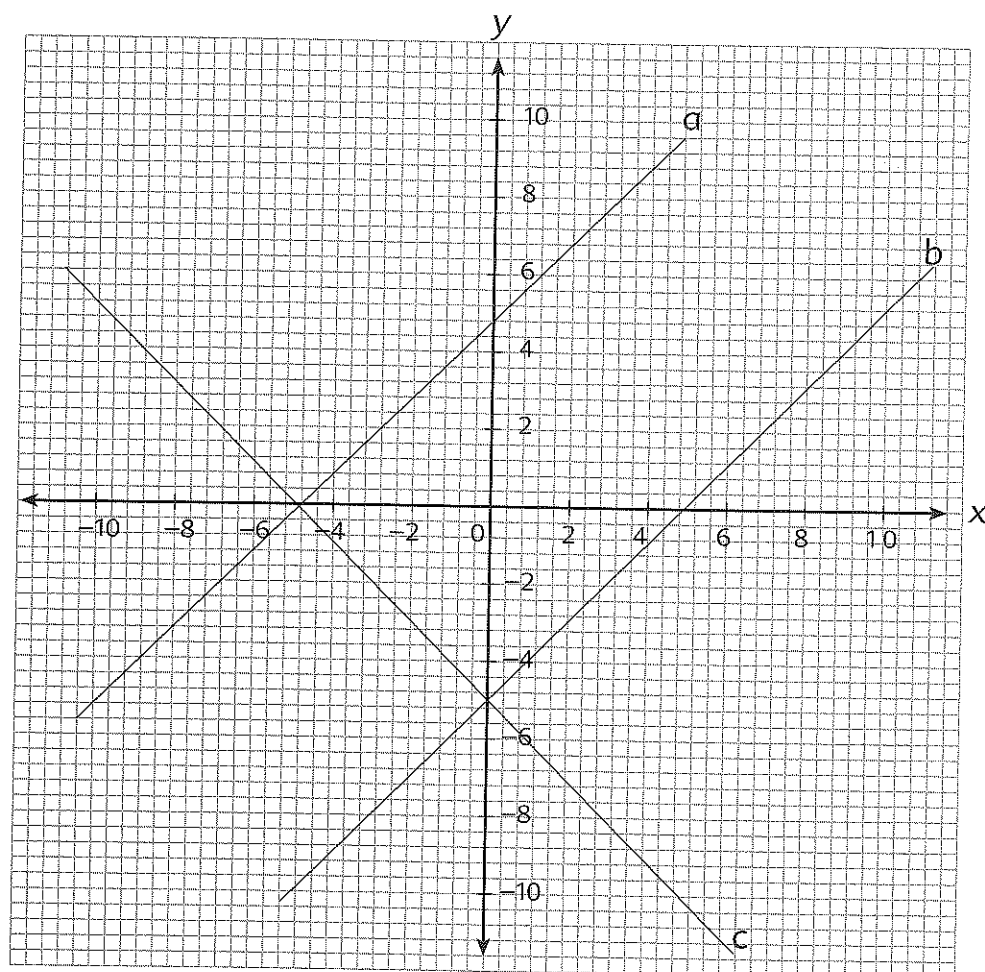
(c) The equation of the line is _____.

(d) Another point on the line that would satisfy the equation in (c) is _____.

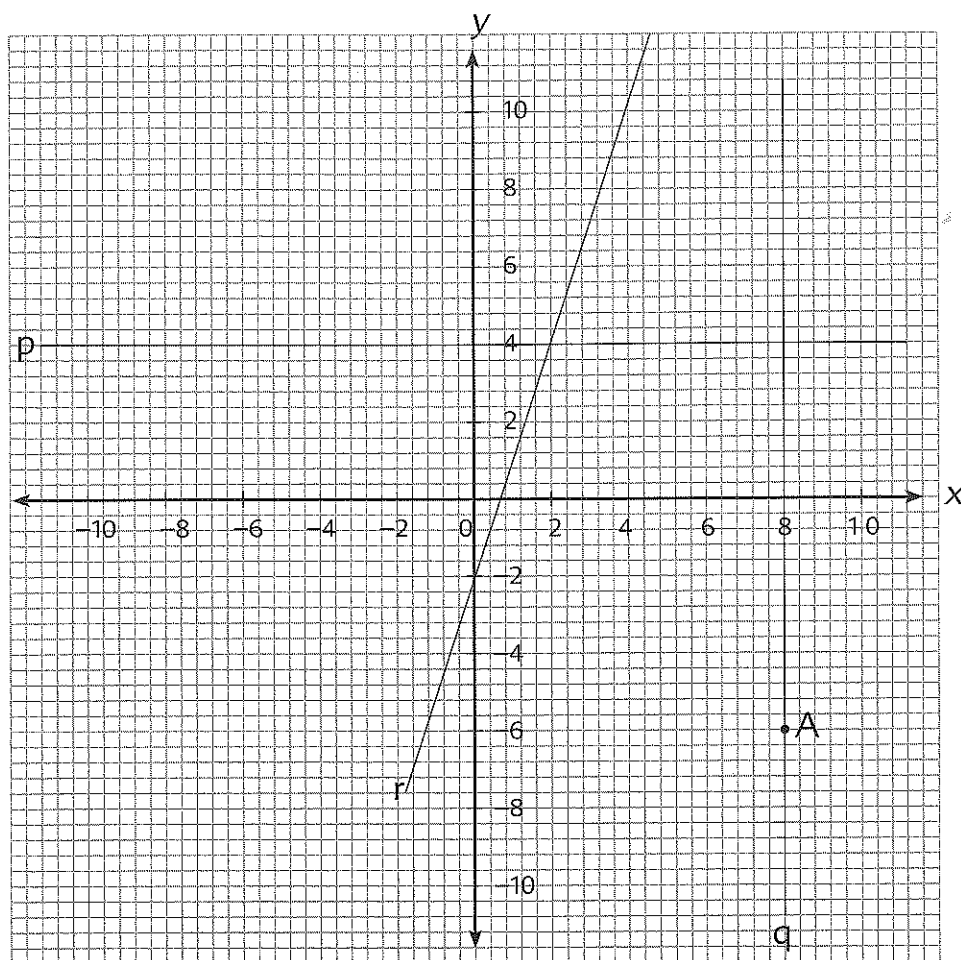
4. (a) Complete the table for $y = x + 5$ for values of x from -3 to 3 .

x	-3	-2	-1	0	1	2	3
y	2						
(x, y)	$(-3, 2)$						

- (b) Which line is a graph of the equation $y = x + 5$?



5. Fill in the blanks.



- The coordinates of point A is _____.
- Any point on line _____ has an x-coordinate of 8.
- The coordinates of the intersection point of Lines p and q is _____.
- The coordinates of the intersection point of Lines p and r is _____.
- For Line r, when $x = 0$, y is _____.
- The equation of Line p is _____.

ANSWERS

Unit 1 Whole Numbers

Exercise 1

- 6,248,903
 - 40,827,600
 - 988,560,201
 - 1,000,635,000
 - 3,000,000,877
 - 9,054,000,062
- Five million, two hundred thousand
 - Eighteen million, six hundred seven thousand
 - Four hundred thirty-five million, nine hundred twelve thousand sixty-seven
 - Two billion, three hundred ninety-eight million, seven hundred one thousand six
- $600,000,000 + 90,000,000 + 8,000,000 + 700,000 + 60,000 + 2000 + 100$
 - $1,000,000,000 + 300,000,000 + 70,000,000 + 9,000,000 + 200,000 + 60,000 + 5000 + 100 + 80 + 4$
- 6,009,300
 - 20,000,000
 - 5,000,000
 - 800,000,000
- 876,079,000
 - 66,327,400
 - 10,732,456
 - 752,109,634
- 2,000,000
 - hundred thousands
 - hundred millions
 - 3
- <
 - >
 - <
 - <

Exercise 2

- 9,000,000
 - 11,000,000
- 20,000,000
 - 50,000,000
 - 810,000,000
 - 120,000,000
- 600,000,000
 - 6,900,000,000
 - 300,000,000
 - 6,800,000,000
- 5,200,000,000
 - 5,194,700,000
 - 5,195,000,000
 - 5,194,740,000
 - 5,190,000,000
 - 5,194,736,000
- 8,356,497,000
 - 8,356,000,000
 - 8,356,500,000
 - 8,356,500,000
 - 8,400,000,000
 - 8,360,000,000
- $8,000,000 + 4,000,000 = 12,000,000$
 - $921,000,000 - 599,000,000 = 322,000,000$
 - $8,000,000 - 2,000,000 = 6,000,000$
 - $614,000,000 + 388,000,000 = 1,002,000,000$
- 400,000 ; 1,200,000
 - 600,000 ; 100,000
 - 1,000,000 ; 4,000,000
 - 8,000,000 ; 1,600,000

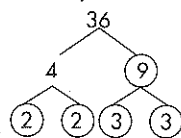
Exercise 3

- 1, 2, 3, 4, 6, 8, 12, 24
 - 1, 3, 5, 15, 25, 75
 - 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84
 - 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96
 - 1, 11, 121
- 12
 - 20
 - 30
 - 21
 - 3
 - 13

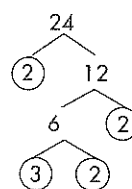
Exercise 4

- 3, 5
 - 2, 5
 - 3, 11
- -

2. (a)



(b)



3. (a) 11^3

(c) $7^3 \times 13^2$

(b) 2^5

(d) $5^4 \times 3^2$

4. (a) 64

(b) 343

(c) 225

5. (a) $2^2 \times 7$

(b) $2^2 \times 3^2$

(c) 5×2^3

Exercise 5

- 3,470,000,000
 - 8,160,000,000
 - 1,920,000,000
 - 9,300,000,000
 - 1,770,000,000
 - 379,000,000
 - 165,200,000
 - 514,000,000
 - 2,828,000,000
 - 3,720,000,000
- $40,000,000 \times 100 = 4,000,000,000$
 - $60,000,000 \times 20 = 1,200,000,000$
 - $700,000 \times 4000 = 2,800,000,000$
 - $800,000 \times 60 = 48,000,000$

Exercise 6

- 59,000,000
 - 30,000,000
 - 111,000,000
 - 23,000,000
 - 900,000
 - 130,000
 - 4,500,000
 - 250,000
 - 6000
 - 12,000
- $40,000,000 \div 20 = 2,000,000$
 - $50,000,000 \div 500 = 100,000$
 - $60,000,000 \div 3,000 = 20,000$
 - $2,000,000,000 \div 400 = 5,000,000$

Unit 2 More Calculations with Whole Numbers

Exercise 1

- 24
 - 49
 - 47
 - 19
 - 25
 - 16
 - 8
 - 19
 - 0
 - 56
 - 63
 - 11
 - 22
 - 10
 - 54
 - 37
 - 90
 - 30
 - 0
 - 27

Exercise 2

- 224
 - 712
 - 1708
 - 490
 - 1550
 - 2700
 - 106
 - 800
 - 426
 - 2262
- 1333
 - 5643
 - 1349
 - 1092
 - 950
 - 1500
 - 4400
 - 3762
 - 2184
 - 1100

Exercise 3

- | | | |
|-------------|-----------|------------|
| 1. (a) 2170 | (b) 1000 | (c) 213 |
| (d) 10 | (e) 340 | (f) 93 |
| 2. (a) 261 | (b) 100 | (c) 550 |
| (d) 720 | (e) \$135 | (f) 125 kg |
| (g) \$1200 | (h) \$22 | (i) \$175 |
| (j) 100 | | |

Exercise 4

- | | | |
|-------------|-------------|-------------|
| 1. (a) 1092 | (b) 6400 | (c) 8280 |
| (d) 14,245 | (e) 188,760 | (f) 146,899 |
| (g) 99,015 | (h) 80,122 | (i) 324 |
| (j) 1260 | (k) 945 | (l) 10,125 |
| (m) 22,762 | (n) 68,929 | (o) 426,384 |
| (p) 74,574 | | |

Exercise 5

- | | | |
|---------------|--------------|--------------|
| 1. (a) 3 R 13 | (b) 2 R 22 | (c) 6 R 17 |
| (d) 6 R 5 | (e) 7 R 2 | (f) 89 R 2 |
| (g) 24 R 10 | (h) 172 R 19 | (i) 13 R 9 |
| (j) 4 R 2 | (k) 5 R 6 | (l) 217 R 9 |
| (m) 70 R 27 | (n) 80 R 4 | (o) 208 R 21 |
| (p) 96 R 48 | (q) 85 R 40 | (r) 152 R 13 |
| (s) 118 R 1 | (t) 109 R 88 | |
| 2. (a) 118 | (b) 19 | |

Unit 3 Fractions**Exercise 1**

- | | | |
|----------------------------------------------------------------|--------------------|--------------------|
| 1. (a) $\frac{8}{10}$ | (b) $\frac{6}{7}$ | (c) $\frac{2}{5}$ |
| (d) $\frac{5}{6}$ | (e) $\frac{9}{2}$ | (f) $1\frac{1}{4}$ |
| 2. (a) $\frac{5}{9}$ | (b) $\frac{7}{10}$ | (c) $\frac{4}{5}$ |
| (d) $\frac{1}{6}$ | (e) $\frac{11}{4}$ | (f) $2\frac{3}{7}$ |
| 3. (a) $>$ | (b) $>$ | (c) $=$ |
| (d) $<$ | | |
| 4. (a) $\frac{3}{5}, \frac{6}{7}, 1\frac{1}{6}, \frac{11}{8}$ | | |
| (b) $\frac{1}{2}, \frac{2}{3}, \frac{16}{9}, 2\frac{4}{5}$ | | |
| 5. (a) $\frac{13}{6}, \frac{5}{12}, \frac{2}{5}, \frac{1}{10}$ | | |
| (b) $\frac{19}{3}, 2\frac{1}{9}, \frac{3}{2}, \frac{5}{4}$ | | |

Exercise 2

- | | | |
|-----------------------|---------------------|--------------------|
| 1. (a) $5\frac{1}{3}$ | (b) $5\frac{3}{4}$ | (c) $7\frac{2}{5}$ |
| (d) $3\frac{1}{6}$ | (e) $3\frac{1}{2}$ | (f) $3\frac{4}{7}$ |
| (g) $1\frac{1}{2}$ | (h) $1\frac{5}{8}$ | |
| 2. (a) $3\frac{3}{4}$ | (b) $3\frac{3}{8}$ | (c) 8 |
| (d) $3\frac{1}{2}$ | (e) $5\frac{3}{7}$ | (f) 17 |
| (g) $3\frac{1}{2}$ | (h) $19\frac{4}{5}$ | (i) $1\frac{2}{9}$ |
| (j) 7 | | |
| 3. (a) $2\frac{1}{2}$ | (b) $1\frac{7}{9}$ | |
| (c) $\frac{1}{10}$ m | (d) $\frac{2}{3}$ ℓ | |

Exercise 3

- | | | |
|-----------------------|---------------------|----------------------|
| 1. (a) $1\frac{2}{9}$ | (b) $1\frac{7}{15}$ | (c) $1\frac{3}{10}$ |
| (d) $1\frac{5}{9}$ | (e) $1\frac{9}{20}$ | (f) $2\frac{3}{8}$ |
| (g) $3\frac{11}{12}$ | (h) $3\frac{1}{30}$ | (i) $3\frac{3}{20}$ |
| (j) $4\frac{2}{15}$ | | |
| 2. (a) $\frac{3}{8}$ | (b) $\frac{1}{6}$ | (c) $\frac{1}{4}$ |
| (d) $\frac{5}{6}$ | (e) $\frac{3}{5}$ | (f) $1\frac{5}{8}$ |
| (g) $\frac{5}{12}$ | (h) $\frac{7}{12}$ | (i) $\frac{1}{15}$ |
| (j) $\frac{11}{20}$ | (k) $1\frac{8}{15}$ | (l) $2\frac{29}{40}$ |

Exercise 4

- | | | |
|--------------------------|------------------------|-----------------------|
| 1. (a) $5\frac{7}{8}$ | (b) $3\frac{3}{4}$ | (c) $4\frac{1}{3}$ |
| (d) $4\frac{2}{15}$ | (e) $5\frac{1}{6}$ | (f) $5\frac{11}{20}$ |
| (g) $5\frac{7}{12}$ | (h) $4\frac{11}{24}$ | |
| 2. (a) $3\frac{1}{4}$ | (b) $2\frac{1}{2}$ | (c) $1\frac{4}{5}$ |
| (d) $\frac{2}{3}$ | (e) $1\frac{9}{10}$ | (f) $1\frac{5}{12}$ |
| (g) $1\frac{11}{18}$ | (h) $2\frac{17}{24}$ | |
| 3. (a) $1\frac{9}{10}$ m | (b) $7\frac{19}{30}$ h | (c) $2\frac{1}{2}$ kg |
| (d) $2\frac{13}{20}$ lb | | |

Exercise 5

- | | | |
|----------------------------|-----------------------|---------------------|
| 1. (a) 4 | (b) 6 | (c) 12 |
| (d) 36 | (e) $1\frac{1}{2}$ | (f) $13\frac{1}{2}$ |
| (g) $22\frac{1}{2}$ | (h) $16\frac{2}{3}$ | (i) $5\frac{1}{4}$ |
| (j) $29\frac{1}{3}$ | | |
| 2. (a) $2\frac{1}{2}$ cups | (b) $1\frac{3}{4}$ km | |

Exercise 6

- | | | |
|-----------------------|----------------------|---------------------|
| 1. (a) 9 | (b) 30 | (c) $1\frac{1}{3}$ |
| (d) $10\frac{2}{3}$ | (e) $7\frac{7}{8}$ | (f) $22\frac{6}{7}$ |
| 2. (a) 600 | (b) 16 | (c) 30 |
| (d) 4 | (e) 74 | (f) 29 |
| (g) 1500 | (h) 335 | (i) 84 |
| (j) 116 | | |
| 3. (a) 2 kg 250 g | (b) 3 years 8 months | |
| (c) 8 min 18 s | (d) 6 ft 9 in. | |
| (e) 4 km 600 m | (f) 5 m 70 cm | |
| (g) 7 days 20 h | (h) 8 h 8 min | |
| (i) 5 kg 50 g | (j) 10 m 90 cm | |
| (k) 6 ℓ 200 ml | (l) 3 ft 5 in. | |
| (m) 9 h 20 min | (n) 12 weeks 3 days | |
| 4. (a) $\frac{7}{20}$ | (b) $\frac{3}{5}$ | (c) $\frac{11}{40}$ |
| (d) $\frac{1}{4}$ | | (d) $\frac{1}{12}$ |

Exercise 7

1. (a) 42 min (b) $\frac{1}{4}$; $\frac{3}{4}$ (c) 5
 (d) 2 km 600 m (e) \$3 (f) \$320
 (g) 960

Unit 4 Multiply and Divide Fractions**Exercise 1**

1. (a) $\frac{1}{12}$ (b) $\frac{1}{18}$ (c) $\frac{1}{2}$
 (d) $\frac{1}{6}$ (e) $\frac{12}{35}$ (f) $\frac{4}{9}$
 (g) $\frac{5}{13}$ (h) $\frac{33}{65}$ (i) $\frac{8}{21}$
 (j) $\frac{12}{35}$ (k) $\frac{1}{12}$ (l) $\frac{1}{5}$
 (m) $\frac{2}{11}$ (n) $\frac{5}{24}$ (o) $\frac{14}{39}$
 (p) $\frac{1}{10}$
 2. (a) $\frac{2}{5}$ (b) $\frac{9}{14}$

Exercise 2

1. (a) $\frac{1}{5}$ kg (b) 80 (c) 42 (d) 80

Exercise 3

1. (a) $\frac{1}{4}$ (b) $\frac{2}{15}$ (c) $\frac{1}{16}$ (d) $\frac{1}{10}$
 (e) $\frac{1}{12}$ (f) $\frac{1}{14}$ (g) $\frac{1}{16}$ (h) $\frac{2}{35}$
 (i) $\frac{1}{14}$ (j) $\frac{1}{16}$ (k) $\frac{4}{15}$ (l) $\frac{1}{9}$
 (m) $\frac{1}{8}$ (n) $\frac{11}{15}$ (o) $\frac{1}{24}$ (p) $\frac{3}{16}$
 (q) $\frac{1}{15}$ (r) $\frac{7}{30}$ (s) $\frac{1}{12}$ (t) $\frac{1}{10}$

Exercise 4

1. (a) $5\frac{1}{3}$ (b) $5\frac{1}{3}$ (c) $6\frac{2}{3}$ (d) 8
 (e) 16 (f) $19\frac{1}{5}$ (g) 15 (h) 21
 (i) $1\frac{1}{5}$ (j) $\frac{9}{20}$ (k) $\frac{16}{45}$ (l) 4
 (m) 6 (n) $\frac{24}{25}$ (o) $2\frac{5}{8}$ (p) $5\frac{4}{9}$

Exercise 5

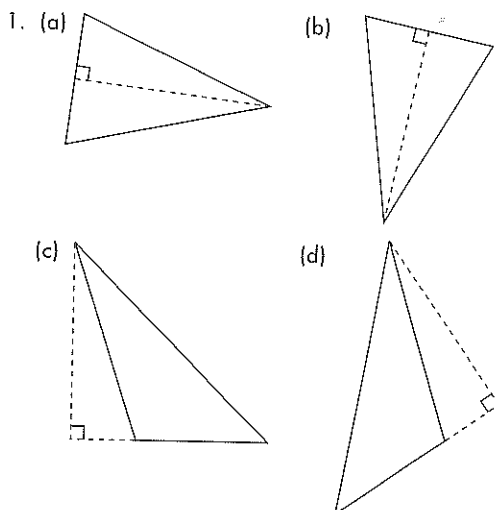
1. (a) $\frac{1}{9}$ m (b) $\frac{2}{7}$ ℓ (c) $\frac{1}{8}$ lb (d) 31
 (e) 200 (f) 9kg (g) $28\frac{1}{12}$ qt (h) 56

Unit 5 Perimeter, Area and Surface Area**Exercise 1**

1. (a) $27\frac{1}{2}$ cm² (b) 21 cm²
 2. (a) $12\frac{1}{2}$ cm² (b) 7 cm²
 (c) 12 cm²

Exercise 2

1. (a) 50 m² (b) 36 cm²
 2. (a) 36 cm (b) 42 in.

Exercise 3

2. (a) AC (b) EF (c) MK (d) HJ
 3. (a) 24 cm² (b) 17.5 cm² (c) 21 cm²
 (d) 16 cm² (e) 8 cm² (f) 25 cm²
 4. (a) 8 cm² (b) 12 cm² (c) 5 cm²
 (d) 7 cm² (e) 20 cm² (f) 56 in.²
 (g) 14 m²

Exercise 4

1. (a) 80 cm² (b) 45 cm² (c) 60 cm²
 (d) 12 cm²
 2. (a) 18 cm² (b) 108 cm² (c) 28 cm²
 (d) 75 cm²

Exercise 5

1. (a) 224 cm² (b) 294 cm² (c) 648 cm²
 (d) 7350 m² (e) 1180 cm² (f) 1.5 m²

Unit 6 Ratio**Exercise 1**

1. (a) 7:5 ; 5:7 (b) 3:4 ; 4:3
 (c) 14:10 ; 10:14
 (d) 7:3 ; 3:7 (e) 4:7 ; 7:4

Exercise 2

1. (a) 2:1 (b) 4:7 (c) 1:3
 (d) 5:11 (e) 7:6 (f) 2:3
 (g) 8:5 (h) 2:1 (i) 4:7
 (j) 5:1

2. (a) 9 (b) 15 (c) 15 (d) 28
 (e) 6 (f) 1 (g) 8 (h) 7
 (i) 11 (j) 36
3. (a) 4:3 (b) 6:7 (c) 1:4 (d) 3:8
 (e) 1:2 (f) 1:3 (g) 4:19 (h) 25 m
 (i) 24 cm (j) 60

Exercise 3

1. (a) 2:3:1 (b) 5:2:3 (c) 5:3:4
 (d) \$1120 (e) \$1512 (f) 39 cm

Unit 7 Decimals

Exercise 1

1. (a) 0.5 (b) 0.43 (c) 0.38
 2. (a) 0.24 (b) 0.007 (c) 1.48
 (d) 0.056 (e) 0.723 (f) 0.801
 (g) 4.309 (h) 6.005
3. (a) $\frac{6}{100}$ (b) $\frac{3}{10}$ (c) $\frac{47}{100}$
 (d) $\frac{9}{100}$ (e) $\frac{1}{1000}$ (f) $\frac{209}{1000}$
4. (a) 0.48 (b) 4.2 (c) 1.01
 (d) 8.57 (e) 0.003 (f) 0.024
5. (a) 6, 2, 1, 5 (b) 1, 0.01 (c) 5, 0.005
 (d) 2, 0.2
6. (a) (i) 0.2
 (ii) 0.8
 (iii) 1.3
 (iv) 2.5
 (b) (i) 4.32
 (ii) 4.36
 (iii) 4.38
 (iv) 4.43
 (c) (i) 3.052
 (ii) 3.057
 (iii) 3.06
 (iv) 3.064
7. (a) 1.899 (b) 1.991 (c) 0.999
 (d) 2
8. (a) 3.102 (b) 10.199 (c) 11.11
 (d) 8.001 (e) 7.015 (f) 0.01
 (g) 0.658 (h) 0.005
9. (a) 8.88, 8.808, 8.088, 8.08
 (b) 3.2, 3.196, 3.19, 3.025
10. (a) 0.4 (b) 0.625 (c) 1.7
 (d) 4.25
11. (a) $1\frac{3}{5}$ (b) $\frac{2}{25}$ (c) $3\frac{9}{20}$
 (d) $5\frac{1}{500}$

Exercise 2

1. (a) 200 (b) 32 (c) 1 (d) 19
 (e) 5 (f) 8 (g) 9 (h) 11
2. (a) 0.2 (b) 4.1 (c) 5.5 (d) 13.6
 (e) 20.8 (f) 11.0 (g) 33.0 (h) 26.0
3. (a) 3.15 (b) 8.43 (c) 1.05 (d) 0.01
 (e) 12.31 (f) 15.24 (g) 27.09 (h) 39.92

Exercise 3

1. (a) 1.132 (b) 5.214 (c) 2.262
 (d) 4.079 (e) 6.555 (f) 3.151
 (g) 7.203 (h) 8.141 (i) 5.29
 (j) 5.299
2. (a) 0.654 (b) 0.199 (c) 0.905 (d) 0.993
3. (a) 26 (b) 36 (c) 10 (d) 1

Exercise 4

1. (a) 13.59 (b) 70.32 (c) 8.1
 (d) 2.34 (e) 364.5 (f) 7.99
2. (a) 15, 15.75 (b) 42, 39.2
 (c) 2, 1.95 (d) 4, 4.05
3. (a) 0.7 (b) 0.3 (c) 3.1 (d) 2.9
4. (a) 0.33 (b) 0.44 (c) 1.86 (d) 4.83

Exercise 5

1. (a) 5, 50, 500
 (b) 2.9, 29, 290
 (c) 32.5, 325, 3250
 (d) 70.18, 701.8, 7018
 (e) 53.67, 536.7, 5367
 (f) 104.01, 1040.1, 10,401
2. (a) 100 (b) 0.7 (c) 1000 (d) 10
 (e) 100 (f) 1000 (g) 10 (h) 1000
 (i) 1000 (j) 100 (k) 1000 (l) 100
3. (a) 18 (b) 0.8 (c) 50 (d) 56
 (e) 678 (f) 160 (g) 45 (h) 950
 (i) 875 (j) 1224 (k) 6200 (l) 14
 (m) 195 (n) 6201 (o) 23,800 (p) 55,020
 (q) 104,800 (r) 270,180

Exercise 6

1. (a) 145.2, 14.52, 1.452
 (b) 6.3, 0.63, 0.063
 (c) 0.5, 0.05, 0.005
 (d) 200.7, 20.07, 2.007
 (e) 38.1, 3.81, 0.381
 (f) 7.9, 0.79, 0.079
2. (a) 100 (b) 60 (c) 10 (d) 418
 (e) 100 (f) 27.5 (g) 10 (h) 3040
 (i) 1000 (j) 9 (k) 100 (l) 0.1
3. (a) 0.12 (b) 0.007 (c) 0.488 (d) 0.475
 (e) 3.4 (f) 2.07 (g) 0.021 (h) 0.02
 (i) 0.032 (j) 0.065 (k) 0.81 (l) 4.5
 (m) 0.024 (n) 0.012 (o) 0.003 (p) 0.041
 (q) 0.025 (r) 0.601

Exercise 7

1. (a) 200 (b) 400 (c) 800 (d) 24,000
 (e) 15,000 (f) 300 (g) 4200 (h) 70
2. (a) 115 (b) 10.88 (c) 1045
 (d) 987.53 (e) 2.1 (f) 10.08
 (g) 940.9 (h) 359.6 (i) 655.2
 (j) 1783.98 (k) 2326.67 (l) 4231.5
 (m) 4970.4 (n) 7023.6

Exercise 8

- (a) 6 (b) 4
- (a) 5.25 (b) 9.55
- (a) 1.46 (b) 0.02 (c) 20.66
(d) 0.92 (e) 0.41

Exercise 9

- (a) 14.85 (b) 8.61 (c) 0.367
(d) 20.06 (e) 0.05 (f) 3.456
(g) 6.832 (h) 8.34
- (a) 0.576 (b) 0.024 (c) 2.6
(d) 0.774 (e) 0.641 (f) 0.025
(g) 18.07 (h) 1.751

Exercise 10

- (a) 80,000 (b) 6000 (c) 23.42
(d) 911.25 (e) 3215 (f) 131.1
(g) 4.1 (h) 41.5
- (a) 14.02 (b) 146.31 (c) 17.53

Unit 8 Measures and Volume

Exercise 1

- (a) 500 (b) 850 (c) 45
(d) 76 (e) 95 (f) 60
(g) 43 (h) 80
- (a) 1 km 350 m (b) 3 l 50 ml
(c) 2 kg 4 g (d) 4 m 80 cm
(e) 0 km 35 m (f) 5 m 7 cm
(g) 4 l 16 ml (h) 0 kg 401 g
- (a) 3.2 (b) 5.06 (c) 2.072
(d) 4.4 (e) 2.52 (f) 6.001
(g) 4.035 (h) 3.208
- (a) 0.073 (b) 0.098 (c) 0.267
(d) 0.304 (e) 1.502 (f) 2.008
(g) 3.064 (h) 41.7

Exercise 2

- (a) 4 cm, 1 cm, 1 cm, 4 cm³
(b) 4 cm, 1 cm, 3 cm, 12 cm³
(c) 4 cm, 3 cm, 1 cm, 12 cm³
(d) 4 cm, 3 cm, 2 cm, 24 cm³
- (a) 21 cm³ (b) 27 cm³
(c) 26 cm³ (d) 20 cm³
- (a) 192 in.³ (b) 125 ft³
- (a) 405 cm³ (b) 240 cm³
- (a) 4.08 l (b) 1.7 l
- (a) 10 cm (b) 8 cm
- (a) 24 (b) 20
- (a) 6 cm (b) 12 cm
- (a) 9 in. (b) 4 l (c) 24 cm
(d) 3 l (e) 150 (f) 20 cm
(g) 4 l (h) 20 (i) 4 cm
(j) 4800 cm³

Unit 9 Percentage

Exercise 1

- (a) 18 (b) 33 (c) 50

- (d) 85
(a) 7% (b) 21% (c) 1%
(d) 36% (e) 10% (f) 2%
(g) 8% (h) 60% (i) 55%
(j) 98% (k) 67% (l) 9%
(m) 75% (n) 80% (o) 32%
(p) 50% (q) 60% (r) 80%
- (a) 4 (b) 100 (c) 34
(d) 17 (e) 56 (f) 100
(g) 78 (h) 100 (i) 6
(j) 89 (k) 100 (l) 100
(m) 100 (n) 41 (o) 100
(p) 27
- (a) 8% (b) 70% (c) 61%
(d) 43% (e) 20% (f) 1%
(g) 57% (h) 38% (i) 5%
(j) 95%
- (a) 0.12 (b) 0.02 (c) 0.27
(d) 0.41 (e) 0.42 (f) 0.58
(g) 0.6 (h) 0.75 (i) 0.88
(j) 0.93
- (a) $\frac{7}{20}$ (b) $\frac{1}{10}$ (c) $\frac{6}{25}$
(d) $\frac{12}{25}$ (e) $\frac{9}{100}$ (f) $\frac{53}{100}$
(g) $\frac{67}{100}$ (h) $\frac{1}{100}$ (i) $\frac{19}{25}$
(j) $\frac{81}{100}$

Exercise 2

- (a) 20% (b) 40% (c) 5% (d) 28%
(e) 52% (f) 58% (g) 60% (h) 55%
- (a) 20% (b) 40% (c) 50% (d) 75%
(e) 60% (f) 25% (g) 18% (h) 8%
(i) 16% (j) 49% (k) 20% (l) 15%
(m) 57% (n) 61% (o) 95% (p) 37%
- (a) $\frac{9}{20}$ (b) 25% (c) 90%
(d) 75% (e) 35% (f) 20%
(g) (i) 35% (ii) 65%
(h) (i) $\frac{4}{5}$ (ii) $\frac{1}{5}$
(j) (i) 70% (ii) 30%
(k) (i) 60% (ii) 40%

Exercise 3

- (a) 20 cm (b) \$212 (c) 102 g
(d) 36 kg (e) 375 m (f) 390 ml
- (a) 231 (b) 66 (c) 32
(d) \$1854 (e) \$390 (f) \$10,400
(g) \$72 (h) \$229.50 (i) 918
(j) \$1160

Unit 10 Angles

Exercise 1

- (a) 30° (b) 42° (c) 89°
(d) 110° (e) 300° (f) 285°
(g) 210° (h) 330°

2. (a) 35° (b) 80°
(c) 125° (d) 155°

Exercise 2

1. (a) 55° (b) 40° (c) 265° (d) 120°
(e) 60° (f) 150° (g) 65° (h) 80°
2. (a) 30° (b) 50° (c) 60° (d) 35°

Exercise 3

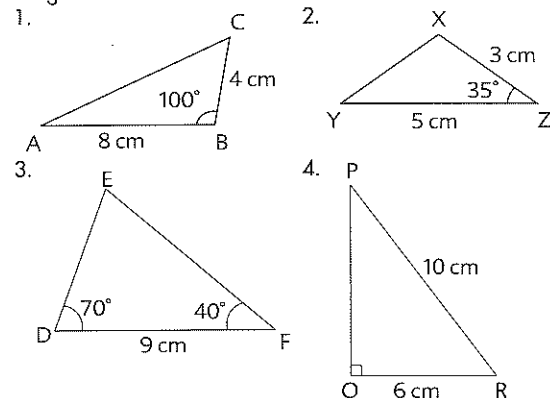
1. (a) 25° (b) 30° (c) 130°
(d) 30° (e) 60° (f) 110°
(g) 45° (h) 125° (i) 60°
2. (a) 75° (b) 120° (c) 54°

Exercise 4

1. (a) 45° (b) 60° (c) 100°
2. (a) 42° (b) 120° (c) 135°
(d) 10° (e) 114°
3. (a) 125° (b) 70° (c) 35°
(d) 60° (e) 20° (f) 30°

Exercise 5

Diagrams not drawn to scale.



Exercise 6

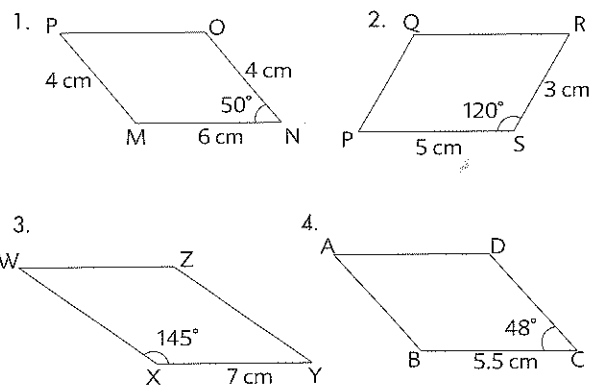
1. (a) 80° (b) 97° (c) 245°
(d) 122° (e) 115° (f) 204°

Exercise 7

1. (a) 55° (b) 120° (c) 103°
(d) 52° (e) 60° (f) 80°
(g) 50° (h) 75° (i) 38°
(j) 140°

Exercise 8

Diagrams not drawn to scale.



Unit 11 Average and Rate

Exercise 1

1. (a) 20 (b) 32 kg (c) 28
(d) \$3.05 (e) 10.82 m
2. (a) 58 kg (b) 2 min 16 s
(c) 3 l 825 ml (d) 75.5
(e) 1 kg 350 g (f) 351

Exercise 2

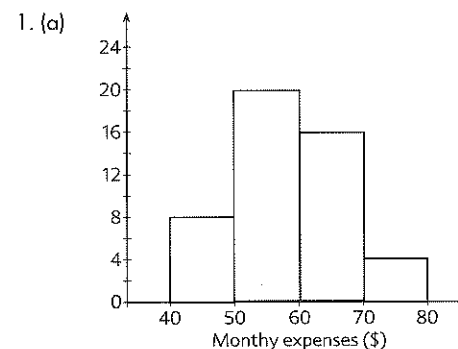
1. (a) 15 (b) 1350 (iii) 9
(c) (i) 6 (ii) 18
(d) 9
2. (a) 48 (b) 9
(c) 12 (d) \$3.60
(e) \$452 (f) 128.75 gal
(g) 4 (h) \$750
(i) 4 km

Unit 12 Data Analysis

Exercise 1

1. (a) 71 (b) 66 (c) 65
2. (a) A (b) C
3. (a) 7.275 hours (b) 7 hours

Exercise 2



- (b) $16\frac{2}{3}\%$
 2. (a) 22 (b) 4 (c) 9 to 10 (d) $\frac{3}{11}$

Exercise 3

1. (a) 1350 (b) 150 (c) 175
 (d) April to May (e) 275
 2. (a) December (b) July, December
 (c) April (d) 10 cm
 (e) 1:3

Exercise 4

1. (a) $\frac{1}{3}$ (b) 25 (c) 2 h
 (d) 4:1 (e) $66\frac{2}{3}$
 2. (a) 20 (b) 10 (c) $\frac{2}{5}$
 (d) 66.7% (e) 4:1:2
 3. (a) $\frac{1}{5}$ (b) 12 (c) fairy tales
 (d) 10 (e) 1:10
 4. (a) $\frac{1}{2}$ (b) 25 (c) 10
 (d) 10 (e) 5:1
 5. (a) 5 (b) \$15 (c) $\frac{1}{2}$
 (d) \$5 (e) 3:5
 6. (a) 40 (b) $\frac{1}{4}$ (c) 560
 (d) 40 (e) 8 : 5 : 6

Unit 13 Algebra

Exercise 1

1. (a) (i) $\$(x + 53)$ (ii) \$58 (iii) \$63
 (b) (i) $\frac{24}{n}$ (ii) 8 (iii) 6
 (c) (i) $\$(m - 2.50)$ (ii) \$7.50 (iii) \$3
 (d) (i) $5k \text{ cm}^2$ (ii) 40 cm^2 (iii) 60 cm^2
 (e) (i) $\$12(s - 1500)$ (ii) \$9600 (iii) \$15,600
 (f) (i) $(\frac{n}{5} - 100)g$ (ii) 1200 g (iii) 1700 g
 2. (a) 7 (b) 28 (c) 100
 (d) 5 (e) 4 (f) 9
 (g) 80 (h) 25
 3. (a) 45 (b) 35 (c) 1
 (d) 3 (e) 105 (f) 192
 (g) 11 (h) 10
 4. (a) $2m$ (b) $3n$ (c) $6p$
 (d) $9q$ (e) $5b$ (f) $12a$
 (g) $7g$ (h) $8e$ (i) $10z - 5$
 (j) $5f - 6$ (k) $f - 6$ (l) $8d + 1$
 (m) $3 + 2a$ (n) $2h + 2$ (o) $8k$
 (p) $15 - r$

Exercise 2

1. (a) +80 (b) -2
 2. (a) $\begin{array}{cccccccccccccccc} -10 & -9 & -8 & -7 & -6 & -5 & -4 & -3 & -2 & -1 & 0 & 1 & 2 & 3 \end{array}$
 (b) $\begin{array}{cccccccccccc} -2 & -1 & 0 & 1 & 2 & 3 & 4 & 5 & 6 \end{array}$

3. (a) > (b) > (c) <
 (d) > (e) < (f) >
 4. (a) 12 (b) 16
 5. (a) 3 (b) -20 (c) 16
 (d) -10 (e) 5 (f) -60
 (g) -33 (h) 45
 6. (a) (i) -10 (ii) -13
 (b) (i) 8 (ii) 28
 7. (a) 2 (b) 42 (c) -57
 (d) -2 (e) 79 (f) -195
 8. (a) 45 (b) 70 (c) -74

Exercise 3

1. (a) $(-10, 10)$ (b) $(-6, 8)$ (c) $(0, 2)$
 (d) $(4, 6)$ (e) $(6, 0)$ (f) $(2, -8)$
 (g) $(-8, -4)$ (h) $(-9, 0)$
 2. (a) 1st quadrant (b) 4th quadrant
 (c) 3rd quadrant (d) 2nd quadrant
 3. (a) 0 (b) 10 (c) $y = x + 8$
 (d) $(1, 9)$
 4. (a)

x	-3	-2	-1	0	1	2	3
y	2	3	4	5	6	7	8
(x,y)	$(-3, 2)$	$(-2, 3)$	$(-1, 4)$	$(0, 5)$	$(1, 6)$	$(2, 7)$	$(3, 8)$

 (b) line a
 5. (a) $(8, -6)$ (b) q (c) $(8, 4)$
 (d) $(2, 4)$ (e) -2 (f) $y = 4$