

YR 7 NAPLAN NUMERACY

Student Name:

.....


The Year 7
NAPLAN Test
Numeracy Workbook

ESPO
Education Support Programmes Pty Ltd

1st Edition

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IMPORTANT NOTE

Checking the answers regularly is important as it ensures you are not continually making the same error. The answers can also give you clues on how to solve a problem if you are unsure about it.

REMEMBER

Always check with **B.O.B.**
(Back Of Book)

What you must know for NAPLAN

Times tables	3
Perimeter	130
<i>Perimeter of a Square</i>	$P = 4s$
<i>Perimeter of a Rectangle</i>	$P = 2l + 2w$
<i>Other figures</i>	<i>(Just add the sides)</i>
Area	130
<i>Area of a Square</i>	$A = s^2$
<i>Area of a Rectangle</i>	$A = l \times w$
<i>Area of a Parallelogram</i>	$A = l \times h$
<i>Area of a Triangle</i>	$A = \frac{1}{2} \times \text{base} \times \text{height}$
Surface Area	139
<i>Surface Area of a Cube</i>	$SA = 6s^2$
<i>Surface Area of a Rectangular Prism</i>	$SA = 2lh + 2lw + 2wh$
<i>Surface Area of a Triangular Prism</i>	$SA = (s_1 + s_2 + s_3) d + s_1 h$
Volume	138
<i>Volume of a Cube</i>	$V = s^3$
<i>Volume of a Rectangular Prism</i>	$V = lwh$
<i>For figures which have vertical sides</i>	$V = \text{Area of the base} \times \text{height}$
<i>Volume of a Triangular Prism</i>	$V = \frac{1}{2} b h d$
Speed, Time & Distance	112, 113, 115
<i>Speed</i>	$= \frac{\text{Distance}}{\text{Time}}$
<i>Time</i>	$= \frac{\text{Distance}}{\text{Speed}}$
<i>Distance</i>	$= \text{Speed} \times \text{Time}$
Types of Triangles	153
<i>Scalene triangles</i> are triangles with all three angles less than 90° .	
<i>Isosceles triangles</i> have two equal angles. The sides opposite these angles are also equal.	
<i>Equilateral triangles</i> have all three sides equal. All angles are also equal to 60° .	

Angles from Parallel Lines..... 151

<i>F Rule</i>	Corresponding angles are equal in value.
<i>U Rule</i>	Co-interior angles add up to 180°.
<i>Z Rule</i>	Alternate angles are equal in value.

Statistics 121

<i>Mean</i>	Average score found by adding all the scores and dividing by number of scores.
<i>Median</i>	Middle number when scores in order.
<i>Mode</i>	Most common score (bimodal).
<i>Range</i>	Distance between the highest and lowest score.

Percentages..... 76, 77

<i>Percentages of quantities</i>	$x\% \text{ of } y = \frac{x}{100} \times y$
<i>Percentage one quantity is of another</i>	$\% = \frac{a}{b} \times 100$



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Number Theory and Basic Operations

THE NUMBER SYSTEM

The number system we use is based on groups of ten placed in order so that position in a number indicates value. Thus the number '6' has a different value in the number 5467 from its value in the number 6457—as does '5' while the '4' and '7' have the same value in each number.

How the System Works

Numbers are arranged in columns according to their value, the number 46257.38 arranged showing the value of each of the numbers is:

TENS OF THOUSANDS	THOUSANDS	HUNDREDS	TENS	UNITS	.	TENTHS	HUNDREDTHS
4	6	2	5	7	.	3	8

When this number is written as words, it is expressed as:

Forty-six thousand,
two hundred and fifty-seven
and thirty-eight hundredths.

NOTE

It is also common usage to express numbers after the decimal point thus:

.38 would be **point three eight**, instead of as tenths or hundredths.

Exercise 1.1

1. Write the following numbers in words.

a) 416.58 _____

b) 1908 _____

c) 39842.351 _____

d) 0.4563 _____

2. Which number is nine thousand and thirty-seven?

9370

9307

9037

9307

IMPORTANT

The questions in the NAPLAN Test are asked in a similar fashion to question 2 above and you are asked to shade the box below the correct answer using only a 2B pencil.

POINT TO NOTE

When checking your answers you will find an *a, b, c* or *d* corresponding to the 1st, 2nd, 3rd or 4th option.

When answering multiple-choice questions, once you've identified the correct answer, it is a good idea to check that the other answers are definitely wrong.

NUMBER THEORY

A. Natural Numbers

Prime Numbers

Prime numbers have only two factors → itself and one.

* **EXAMPLE 1:** 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97, 101, 103 are prime numbers.

Composite Numbers

Composite numbers are numbers which have more than 2 factors.

* **EXAMPLE 2:** 36 has factors 1, 2, 3, 4, 6, 9, 12, 18, 36.

Special Cases

1 is neither a prime nor a composite number.

2 is the only even prime.

C. Using Rounding Off to Estimate Answers

RULE 2: Estimate by rounding off the first digit, then replace the others with zeros.

Estimate the product $379 \times 29 = 400 \times 30$
 $= 12\,000$

It is good to remember if the correct answer is smaller or larger than the estimate. This may be helpful when using the answer as a part of further calculations. In this case, because both 300 and 40 are bigger than the exact numbers, the estimate is greater.

POINT TO NOTE

Sometimes you may recognise a number fact you already know and be able to use it to make a quick estimation.

For example: 6.2×8.9 is close to 6×9 and so a good estimate is 54; likewise, $72.6 \div 8.8$ is close to $72 \div 9$ and you know from your times tables that a good estimate is 8.

Exercise 1.4

1. Estimate by rounding off to the nearest 1, 10, 100 or 1000 (as indicated in brackets), to give the best approximation.

a) $89 + 546$ (10)

b) $853 - 451$ (10)

c) 674×723 (100)

d) 8739 (1000) \times 379 (100)

e) 56.9 (10) \div 8.2 (1)

f) $437.9 \div 531$ (100)

D. Index Notation

RULE 3: Index notation (or powers) is a convenient way of expressing a product with the same factors.

*** EXAMPLE 5:**

a) Write 5^3 in expanded form.

b) Write $3 \times 3 \times 7 \times 2 \times 3 \times 2$ in index notation.

Solution:

a) $5 \times 5 \times 5$

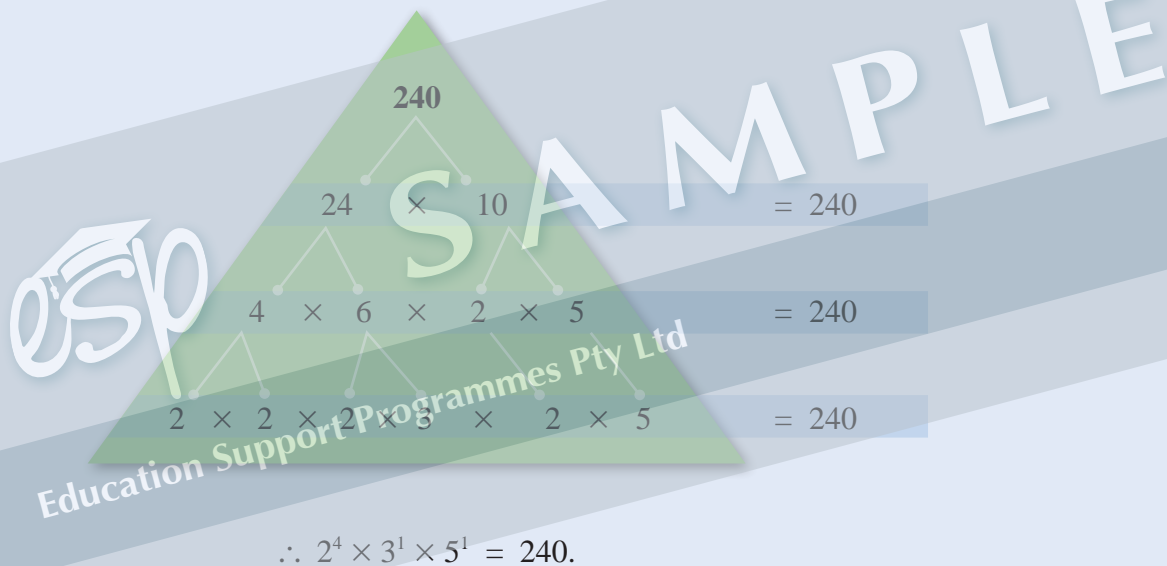
b) $2^2 \times 3^3 \times 7^1$

(Note: $7^1 = 7$)

All natural numbers can be written as a product of prime numbers. One way to do this is by using a factor tree as shown below.

*** EXAMPLE 6:** Express 240 as a product of prime numbers.

Solution:



E. Square Roots

RULE 4: A square root is the number of which a given quantity is the square.
(e.g. 3 is the square root of 9 because $3^2 = 9$)

Square roots are written in the following way $\sqrt{9} = 3$.

Most operations which we have encountered in mathematics so far have an opposite (or inverse). Addition is the inverse of subtraction, multiplication is the inverse of division and the square is the inverse of the square root.

F. Order Convention

RULE 8: Order of Operations

- Do brackets first.
- Do indices (or powers) next.
- Then multiplication and division, working from left to right.
- Then addition and subtraction, working from left to right.

*** EXAMPLE 8:** Evaluate $16 \div 4 + 13 \times 2 - 4$.

$$\begin{aligned}\text{Solution:} \quad & 16 \div 4 + 13 \times 2 - 4 && (\div, \times, \text{left to right}) \\ = & \quad \underline{4} + \underline{26} - 4 && (+, -, \text{left to right}) \\ = & \quad 30 - 4 \\ = & \quad 26\end{aligned}$$

*** EXAMPLE 9:** Find the value of $18 \div 6 - (3 - 4 \times 8) + 40 \div 4$.

$$\begin{aligned}\text{Solution:} \quad & 18 \div 6 - (3 - 4 \times 8) + 40 \div 4 && (\text{do brackets first}) \\ = & \underline{18 \div 6} - (3 - 32) + 40 \div 4 && (\div, \times, \text{left to right}) \\ = & \underline{3} - \underline{-29} + \underline{40 \div 4} && (\div, \times, \text{left to right}) \\ = & \quad 32 + 10 && (+, -, \text{left to right}) \\ = & \quad 42\end{aligned}$$

*** EXAMPLE 10:** Find the value of $37 - (6 + 2)^2 \div 8$

$$\begin{aligned}\text{Solution:} \quad & 37 - (6 + 2)^2 \div 8 && (\text{do brackets first}) \\ = & 37 - \underline{8^2} \div 8 && (\text{do indices next}) \\ = & 37 - \underline{64} \div 8 && (\div, \times, \text{left to right}) \\ = & 37 - 8 && (+, -, \text{left to right}) \\ = & \quad 29\end{aligned}$$

 **Exercise 1.8**

1. Evaluate each of the following:

a) $37 - 15 \div 3$

b) $(37 - 16) \div 3$

c) $26 - (5 + 2 \times 3)$

d) $16 \div 4 - 18 \div 6$

e) $6 \times (7 - 5) + 90 \div (14 \times 2 - 10)$

f) $7 \times (10 \div 5 - 1) + (11 \times 3 - 20)$



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BASIC OPERATIONS

I. Directed Numbers

A helpful way to learn to understand how positive and negative numbers work when they are added and subtracted is to use a number line.

*** EXAMPLE 13:** Use a number line to find the result when 6 is added to -3 .

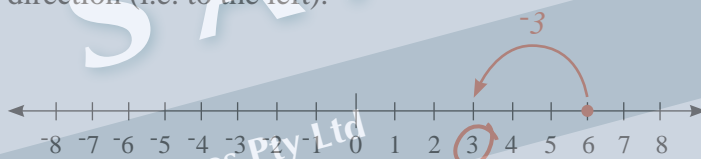
Solution: A number line has a positive direction and a negative direction.



Step 1: Start by marking the position of the first number.



Step 2: Move from that position to show -3 . That is 3 places in the negative direction (i.e. to the left).



thus $6 - 3 = 3$



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Exercise 1.14

1. Calculate:

a) $20 \div -4$

b) $-96 \div -12$

c) $54 \div -9$

d) 15×-7

e) -7×-13

f) -21×5

2. Evaluate:

a) $\frac{36}{3}$

b) $\frac{-24}{8}$

c) $\frac{-10 \times -6}{6 \times -2}$

d) $\frac{-8 \times -9}{15 - 3}$

e) $\frac{5 \times -7}{3 - 7}$

f) $\frac{(-9)^2}{3}$

3. Find the answer. (Remember the order of operation rules.)

a) $8 \times -6 - -7$

b) $(12 + 16) \div -4 \times 3 - -2$

c) $-4 \times -12 \div (11 - 3)$

d) $7 - 10 \times 5 - 7$

e) $-3 \times 5 + -7 \times -4$

f) $8 \times -5 - -3 \times -6$



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The Commutative Law of Addition and Multiplication

When adding numbers, the operation can be done in any order.

$$4 + 7 + 13 = 7 + 13 + 4$$

The same applies when multiplying.

$$12 \times 4 \times 7 = 7 \times 12 \times 4$$

The commutative law does not apply to subtraction or division.

$$\text{Thus } 7 - 2 \neq 2 - 7 \quad \text{and} \quad 9 \div 3 \neq 3 \div 9$$

The Associative Law of Addition and Multiplication

It does not matter how you group numbers when you add numbers.

$$\text{Thus } (5 + 7) + 6 = 5 + (7 + 6)$$

The same applies to multiplication.

$$\text{Thus } (4 \times 8) \times 5 = 4 \times (8 \times 5)$$

The associative law does not apply to subtraction or division.

$$\text{Thus } (5 - 9) - 6 \neq 5 - (9 - 6) \quad \text{and} \quad (6 \div 2) \div 3 \neq 6 \div (2 \div 3)$$

The Distributive Law of Multiplication

When multiplying numbers, you get the same answer when you:

- multiply a number by **a group of numbers added together**, or
- do each multiply **separately** then add them together.

$$\text{Thus } 23 \times 30 = 20 \times 30 + 3 \times 30.$$

These laws can help you to add and multiply quite quickly in your head.

*** EXAMPLE 24:** Calculate:

- a) $34 + 28 + 16$
- b) 209×8
- c) 97×83

Solution:

$$\begin{aligned} \text{a) } 34 + 28 + 16 &= 34 + 16 + 28 \\ &= 50 + 28 \\ &= 78 \end{aligned}$$

By rearranging the numbers, we create two simple additions and thus make the calculation easier.

$$\begin{aligned} \text{b) } 209 \times 8 &= (200 \times 8) + (9 \times 8) \\ &= 1600 + 72 \\ &= 1672 \end{aligned}$$

$$\begin{aligned} \text{c) } 97 \times 83 &= (100 - 3) \times 83 \\ &= (100 \times 83) - (3 \times 83) \\ &= 8300 - 249 \\ &= 8051 \end{aligned}$$

You can see that by regrouping the numbers the calculation has been made easier. Notice that numbers can be redistributed using subtraction as well as addition.



Exercise 1.15

1. Use one or more of the Commutative, Associative and Distributive Laws to solve the following.

a) 52×123

b) 789×22

c) $57 + 78 + 43$

d) $23 + 56 + 27 + 44$

 **Exercise 1.17**



(Complete using your calculator.)

1. Calculate:

a) $1345 + -4214$

b) $-438 - -616$

c) $-58 - 39 + 88$

d) 34×-29

e) $13 + -36 \times -37$

f) $(45 - 164) \times (31 + 42)$

2. Solve these problems:

a) A shopkeeper does the following banking during the week. On Monday she banks \$6794, on Tuesday \$3421 and on Wednesday \$678. On Thursday she banks \$3271 but withdraws \$6784 to buy stock. On Friday she banks \$1273 and pays the employee \$700 and herself \$800. If she had \$7934 in the bank at the beginning, how much does she have at the end of the week?

b) A container of water is at 20°C . It is heated at the rate of 4°C per minute for 10 minutes and then left to stand and cool at the rate of 1.5°C for 10 minutes. What is the final temperature?

c) A prize of \$2442 is to be shared between 12 friends. Each friend will receive _____ dollars and _____ cents.

d) Jack has \$24.60. He wants to buy ice creams which cost \$3.25. How many ice creams can he buy and how much change will he receive?

e) Which of the following numbers is a multiple of 5, 6 and 8?

350

360

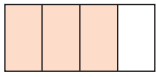
420

480

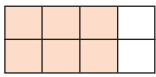
Fractions

A. Equivalent Fractions

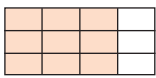
Consider the following representations of fractions:



$$\rightarrow \frac{3}{4}$$



$$\rightarrow \frac{6}{8}$$



$$\rightarrow \frac{9}{12}$$

You can see that $\frac{3}{4} = \frac{6}{8} = \frac{9}{12}$

notice that $\frac{3 \times 2}{4 \times 2} = \frac{6}{8}$

and $\frac{3 \times 3}{4 \times 3} = \frac{9}{12}$

We say that $\frac{3}{4}$, $\frac{6}{8}$, $\frac{9}{12}$ are equivalent fractions.

Rule 1: By multiplying the numerator and denominator by the same number, an **equivalent fraction** is formed.

* **EXAMPLE 1:** Express each of the following with a denominator of 24.

a) $\frac{3}{4}$

b) $\frac{2}{3}$

Solution:

a) $\frac{3}{4} = \frac{\square}{24}$

b) $\frac{2}{3} = \frac{\square}{24}$

since $4 \times 6 = 24$

since $3 \times 8 = 24$

$$\therefore \frac{3 \times 6}{4 \times 6} = \frac{\boxed{18}}{24}$$

$$\therefore \frac{2 \times 8}{3 \times 8} = \frac{\boxed{16}}{24}$$

* **EXAMPLE 2:** Express the following in their simplest form.

a) $\frac{30}{42}$

b) $\frac{64}{100}$

Solution:

a) The Highest Common Factor (HCF) of 30 and 42 is 6.

b) The HCF of 64 and 100 is 4.

$$\therefore \frac{30 \div 6}{42 \div 6} = \frac{5}{7}$$

$$\therefore \frac{64 \div 4}{100 \div 4} = \frac{16}{25}$$

* **EXAMPLE 3:** Arrange the following fractions in order of size (smallest to largest).

a) $\frac{3}{10}, \frac{1}{5}, \frac{1}{4}$

Solution:

a) The Lowest Common Multiple (LCM) of 10, 5 and 4 is 20.

$$\therefore \frac{3}{10} = \frac{6}{20}$$

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

$$\text{and } \frac{1}{4} = \frac{5}{20}$$

Thus the order of size is $\frac{1}{5}, \frac{1}{4}, \frac{3}{10}$.

Exercise 2.1

1. Express the following with a denominator of 18.

a) $\frac{1}{2}$

b) $\frac{5}{6}$

c) $\frac{2}{9}$

d) $\frac{2}{3}$

2. Express the following as hundredths.

a) $\frac{4}{10}$




b) $\frac{3}{4}$

c) $\frac{2}{5}$






d) $\frac{11}{25}$

Using Calculators to do Calculations with Fractions

These calculations are done on a CASIO FX-82AU PLUS. Your calculator may differ a little from this one, but the general techniques will be similar. (*Consult the instruction booklet that came with your calculator to find the process.*)

Search your keys for one which looks like this . Above it in yellow is the shift function of the key (). These keys are used in conjunction with the  key.

To write the fraction $\frac{5}{7}$.

1. Press 
2. Press 
3. Use the down arrow 
4. Press 
5. Use the right arrow 



Practice Operations (Fractions)

Using your calculator, try finding the answer to this problem:

$$\frac{2}{3} - \frac{7}{10}$$

You should get an answer of:

$$\frac{41}{30} \quad \text{To get this answer as a mixed number, press } \text{SHIFT} \text{ } \text{S}\leftrightarrow\text{D} = 1 \frac{11}{30}$$

Try these:

a) $\frac{7}{8} + \frac{1}{2}$

b) $\frac{2}{3} - \frac{2}{5}$

c) $\frac{4}{9} \times \frac{2}{3}$

d) $\frac{2}{5} \div \frac{6}{7}$

Answers: a) $1 \frac{3}{8}$ b) $\frac{4}{15}$ c) $\frac{8}{27}$ d) $\frac{7}{15}$

SOME USEFUL FRACTION/DECIMAL/PERCENTAGE RELATIONSHIPS

FRACTION	DECIMAL	PERCENTAGE
$\frac{1}{8}$	.125	12 ½%
$\frac{1}{4}$	.25	25%
$\frac{3}{8}$	.375	37 ½%
$\frac{1}{2}$	.5	50%
$\frac{5}{8}$	.625	62 ½%
$\frac{3}{4}$	.75	75%
$\frac{7}{8}$	.875	87 ½%

$\frac{1}{6}$	.16	16 ⅔%
$\frac{2}{6}$ ($\frac{1}{3}$)	.3	33 ⅓%
$\frac{3}{6}$ ($\frac{1}{2}$)	.5	50%
$\frac{4}{6}$ ($\frac{2}{3}$)	.6	66 ⅔%
$\frac{5}{6}$	.83	83 ⅓%

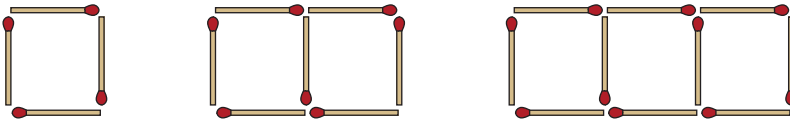
OTHER USEFUL VALUES

$\frac{1}{16}$	.0625	6 ¼%
$\frac{1}{20}$	.05	5%
$\frac{1}{5}$	.2	20%

 **Exercise 5.1**

1. Examine the following pattern and
 - a) make table for the first 5 combinations
 - b) make a rule for the relationship
 - c) find out how many matches would be needed to make 10 squares.

Make s the number of squares and m the number of matches.



a)

s					
m					

b) _____

c)



SAMPLE

2. Now do the same for the following pattern of hexagons.
Make h the number of hexagons and r the number of rods.



a)

h					
r					

b) _____

c)

F. Solving Problems Using Algebra

When solving equations in algebra it is necessary to maintain the balance of the equation.

RULE 3: Balancing equations is done by applying the same operation — **addition** (+), **subtraction** (−), **multiplication** (×) or **division** (÷) — on both sides of the equation.

* **EXAMPLE 9:** A number is multiplied by 7 and then 3 is subtracted. If the result is 25, what is the value of the number?

Solution:

Let the number be n .

$$\begin{aligned} \text{then} \quad & 7n - 3 = 25 \\ + 3, \quad & 7n - 3 + 3 = 25 + 3 \\ \div 7, \quad & 7n \div 7 = 28 \div 7 \\ & n = 4 \end{aligned}$$

Writing the steps at the beginning of each line is a helpful way to set these sums out.

* **EXAMPLE 10:** Amy is 6 years older than Jane. If the combined age of the two girls is 20 years, how old is Jane?

Solution:

Let y be Jane's age.

Then Amy is $y + 6$.

$$\begin{aligned} \text{Together their total number of years} &= y + 6 + y \\ &= 2y + 6 \end{aligned}$$

$$\begin{aligned} \therefore \quad & 2y + 6 = 20 \\ - 6, \quad & 2y + 6 - 6 = 20 - 6 \\ \div 2, \quad & 2y \div 2 = 14 \div 2 \\ & y = 7 \end{aligned}$$

\therefore Jane is 7 years old.



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SAMPLE

Ratio and Rates

RATIO

A **ratio** expresses the size of two quantities relative to each other. The ratio of two quantities indicates how many times one quantity is contained in another. For example, if the ratio of blue marbles to red marbles is 3 : 1, then there are 3 times as many blue marbles as red marbles.

Ratios are best expressed as two integers.

Equivalent ratios are similar to equivalent fractions.

A. Expressing Ratios as Integers

When expressed as a common fraction

For example, the number of girls in a class is $\frac{1}{4}$ the number of boys.

Then the ratio **girls : boys** can be expressed as $\frac{1}{4} : 1$
or by multiplying by 4, the ratio becomes 1 : 4.

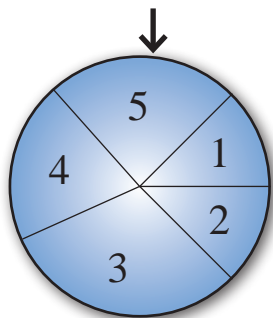
When expressed as a decimal fraction

For example, the number of motorcycles to motor scooters is 3 : 0.6.

Convert the decimal to a whole number by multiplying by 10, then the ratio becomes 30 : 6.

This could be expressed as 5 : 1 as 6 is a factor of both 30 and 6.

3.



If this wheel is spun:

a) Which number is *most* likely to end nearest the arrow?

b) Which numbers are *least* likely to end nearest the arrow?

c) If Janice spins the wheel 200 times, which of the following is the more likely set of outcomes?

No.	No. of spins
1	20
2	20
3	70
4	30
5	50

No.	No. of spins
1	15
2	15
3	90
4	30
5	50

No.	No. of spins
1	40
2	40
3	60
4	20
5	20

No.	No. of spins
1	25
2	25
3	70
4	30
5	50



RULE 3: Statistics deals with the collection and classification of numerical facts and data.

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B. Measures of Centre and Spread

The following terms are used to describe measurements calculated from collected data.

Mean	Add up all the scores and divide by the total number of scores.
Median	The middle number when arranged in ascending order.
Mode	The number that occurs most often.
Range	Distance between the highest and lowest score.

4. Find the **range** of the following distribution:
7, 8, 16, 11, 15, 3, 24, 8, 16, 20, 17, 40, 26

5. After six innings in cricket, David's average was 28. After eight innings his average was 35. The combined total in his final two innings was:

- 70 98 112 168
-

C. Graphing Data

Statistical data are often displayed graphically. This allows quick and easy interpretation of the data.

*** EXAMPLE 4:**

The following data were collected. The task was to observe cars coming over the Story Bridge over a ten-minute period and to list their colours. Only the six most popular colours were included.

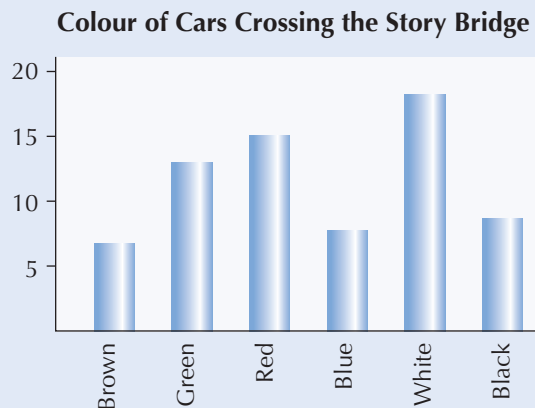
Colour	Tally	No.
Brown	|||| ||	7
Green	|||| |||	13
Red	|||| |||	15
Blue	|||| |	8
White	|||| ||| ||	18
Black	|||| |	9
TOTAL		70

When taking a tally it helps the final count if you use groups of five.

Four vertical lines with the 5th diagonal.

Solution:

These data can be transferred to a graph as follows:

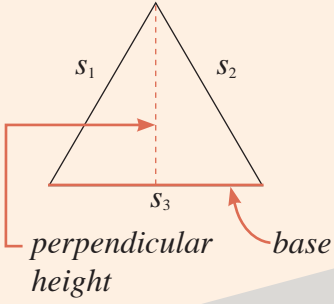


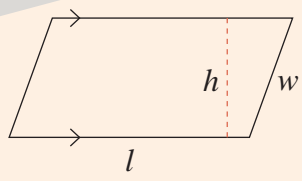


All statistical data must have a title

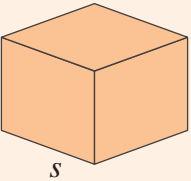
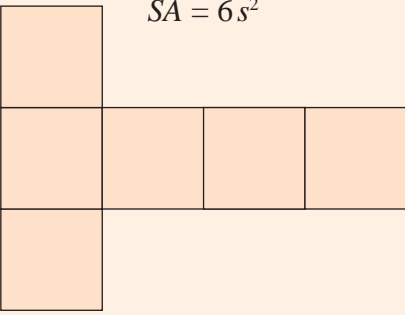
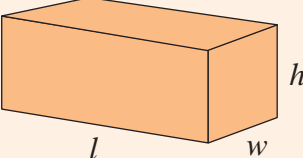
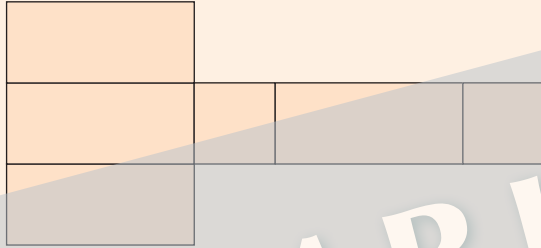
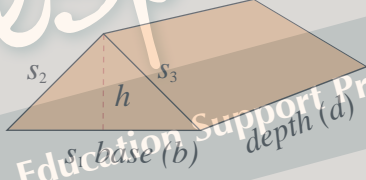
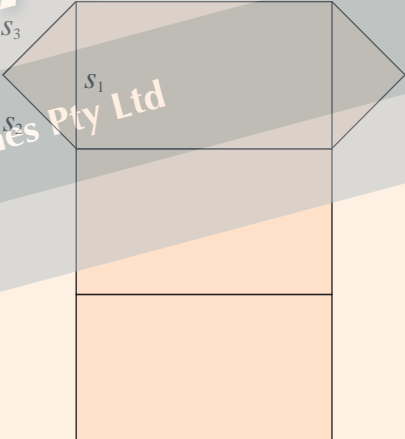
Measurement

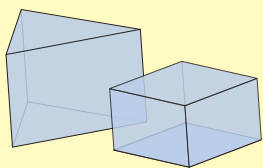
Perimeter and Area

RULE 1: Formulae for calculating **perimeter** and **area** of regular shapes.

FIGURE	PERIMETER	AREA
<p>Triangle</p> 	$P = s_1 + s_2 + s_3$	$A = \frac{1}{2} \times \text{base} \times \text{height}$
<p>Square</p> 	$P = 4s$	$A = s^2$
<p>Rectangle</p> 	$P = 2l + 2w$	$A = l \times w$
<p>Parallelogram</p> 	$P = 2l + 2w$	$A = l \times h$

RULES FOR SURFACE AREA AND VOLUME

FIGURE	SURFACE AREA	VOLUME
<p>Cube</p> 	<p>$SA = 6s^2$</p> 	<p>$V = s^3$</p>
<p>Rectangular prism</p> 	<p>$SA = 2lh + 2lw + 2wh$</p> 	<p>$V = lwh$</p>
<p>Triangular prism</p> 	<p>$SA = (s_1 + s_2 + s_3) d + s_1 h$</p> 	<p>$V = \frac{1}{2} b h d$</p>

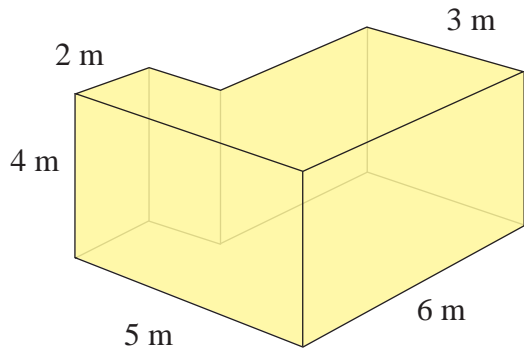


NOTE:

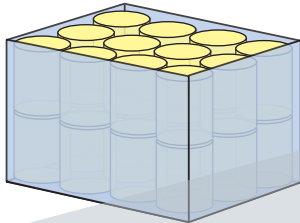
for all figures which have vertical sides

$Volume = Area\ of\ the\ base \times height$

5. Find the volume of the following shape:



6.



A box holds two layers of cans 10 cm in diameter and 15 cm high. If the box holds 24 cans as shown, what are the dimensions of the box?



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E. Units of Capacity

Capacity is used for the **volume of fluids**.

Converting Volume to Capacity

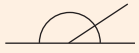
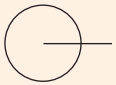

$$\begin{array}{ll} 1 \text{ cm}^3 = 1 \text{ mL} & 1 \text{ m}^3 = 1 \text{ kL}^* \\ 1000 \text{ cm}^3 = 1 \text{ L} & 1000 \text{ m}^3 = 1 \text{ ML}^{**} \end{array}$$

*Kilolitre (kL) = 1000 L

**Megalitre (ML) = 1 000 000 L
= 1000 kL

B. Angles from Straight Lines

RULE 1: The following rules apply to **straight lines**.

SYMBOL	MEANING	* EXAMPLE 2
	Angles on a straight line add up to 180° .	$\frac{120^\circ}{x}$ $x = 180 - 120$ $= 60^\circ$
	A revolution is 360° .	$\frac{130^\circ}{x} \quad 40^\circ$ $x = 360 - 130 - 40$ $= 190^\circ$
	Vertically opposite angles have the same value.	$\frac{50^\circ}{x}$ $x = 50^\circ$

C. Types of Angles

There are three types of angles:

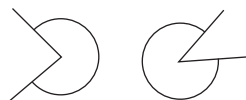
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Acute angles are angles less than 90° .



Obtuse angles are angles between 90° and 180° .



Reflex angles are angles between 180° and 360° .

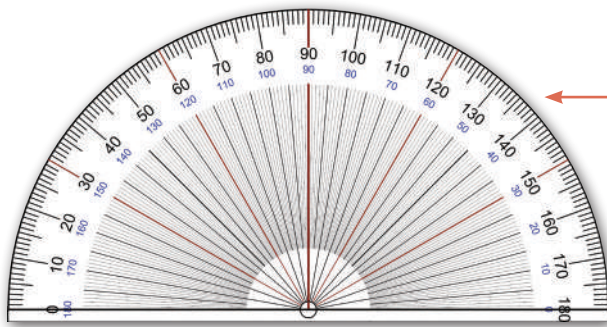
NOTE

180° is a straight line angle, neither acute or obtuse.

360° is a revolution and is not a reflex angle.

D. Measuring Angles

Angles are measured with a protractor.

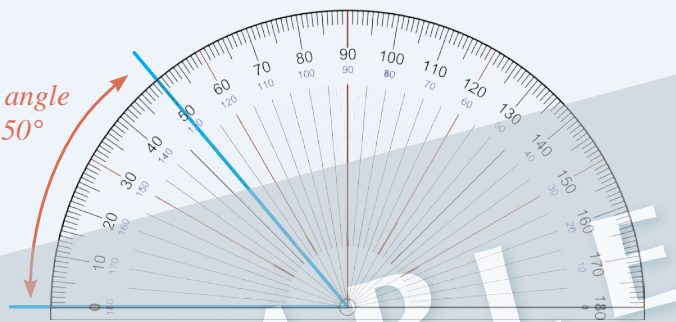


This protractor measures angles from 0–180°. It has two scales, one starting from the left (in black), and the other starting from the right (in blue). This is so angles with vertices on both left or right of the angle can be measured.

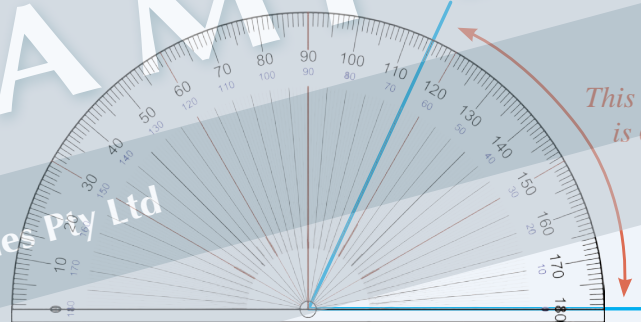
Using a Protractor

To measure an angle place one arm along the base line (0°) with the vertex at the centre of the protractor, then read off the angle (making sure you read the correct scale).

This angle is 50°



This angle is 65°

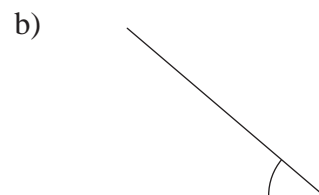
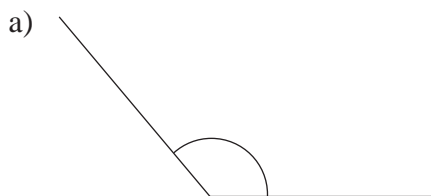


SAMPLE

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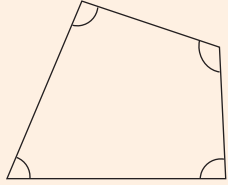
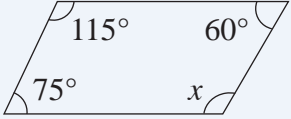
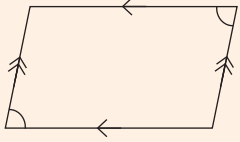
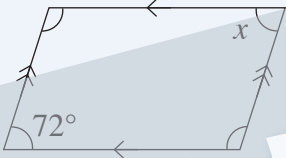
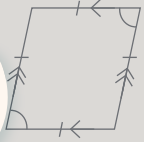
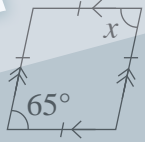
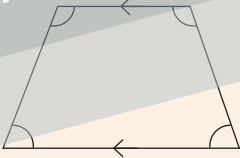
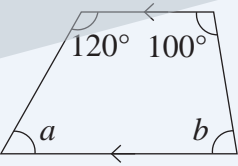
Exercise 9.1

1. Measure the following angles.



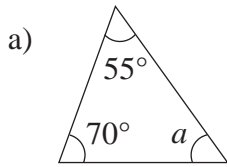
Quadrilaterals

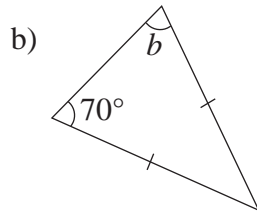
RULE 4: The following rules apply to **quadrilaterals**.

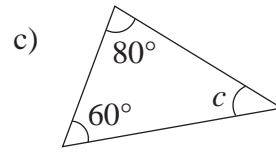
SYMBOL	MEANING	* EXAMPLE 6
<p>Quadrilateral</p> 	<p>Angles in a quadrilateral add up to 360°.</p>	 $x = 360 - 115 - 75 - 60$ $= 110^\circ$
<p>Parallelogram</p> 	<p>Opposite angles of a parallelogram are equal.</p>	 $x = 72^\circ$
<p>Rhombus</p> 	<p>Opposite angles equal, all sides equal, opposite sides parallel. (A square pushed out of shape.)</p>	 $x = 65^\circ$
<p>Trapezium</p> 	<p>One pair of parallel sides. Pairs of supplementary angles.</p>	 $a + 120^\circ = 180^\circ$ $a = 60^\circ$ $b + 100^\circ = 180^\circ$ $b = 80^\circ$

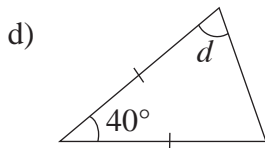
 **Exercise 9.6**

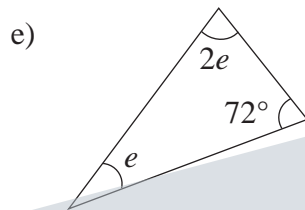
1. Calculate the value of the unknowns in the following:

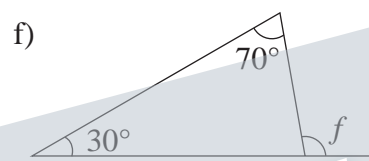




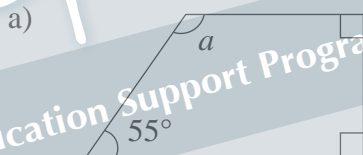


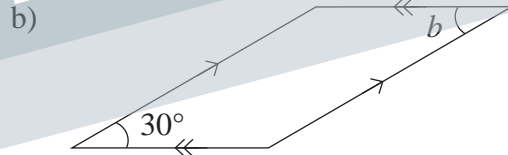


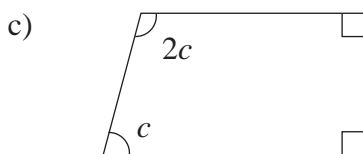


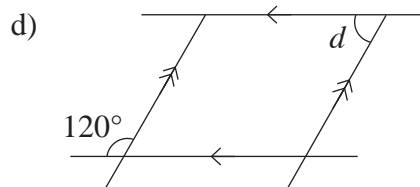


2. Calculate the value of the unknowns in the following:



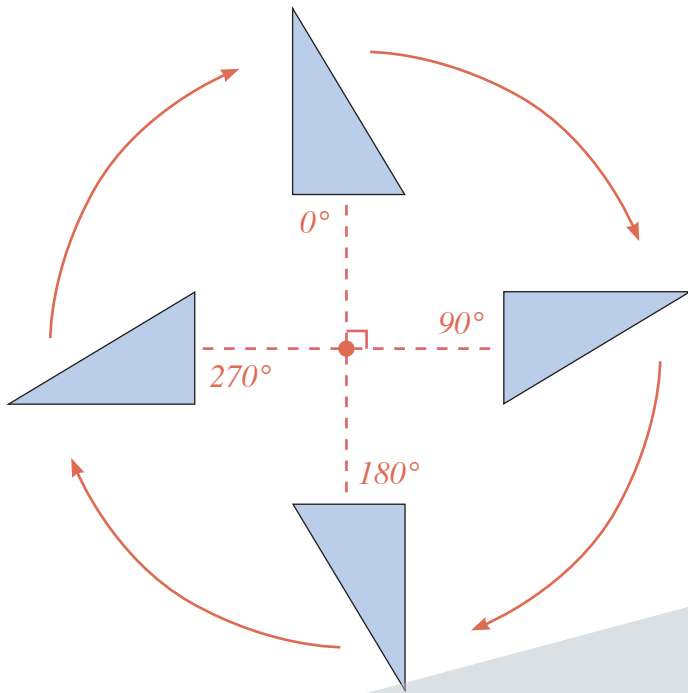






B. Rotation

Let us examine what happens when a figure is rotated about a point.



* **EXAMPLE 3:** Draw the wheel after it has rotated through:

a) 90°

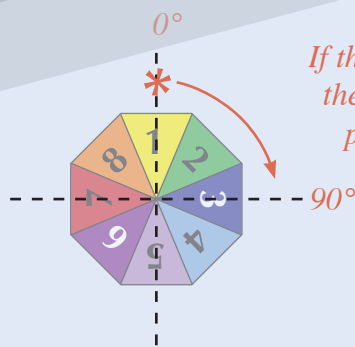
b) 180°

c) 270°

d) 360°



Solution:



If the wheel is rotated to the right 90° , the final position would be:



\therefore The wheel would be in these positions, when rotated through:

a) 90°

b) 180°

c) 270°

d) 360°





Exercise 11.5

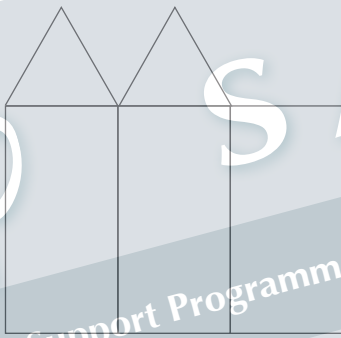
1. Draw a net of:

a) a cube

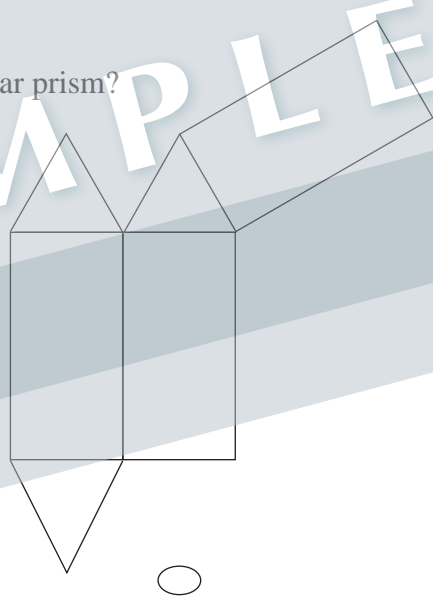


2. Which of the following is the net of a triangular prism?

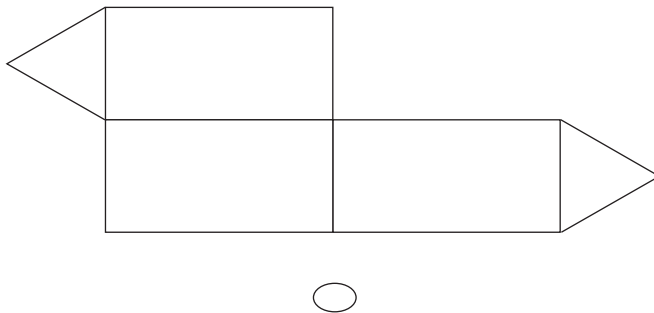
a)



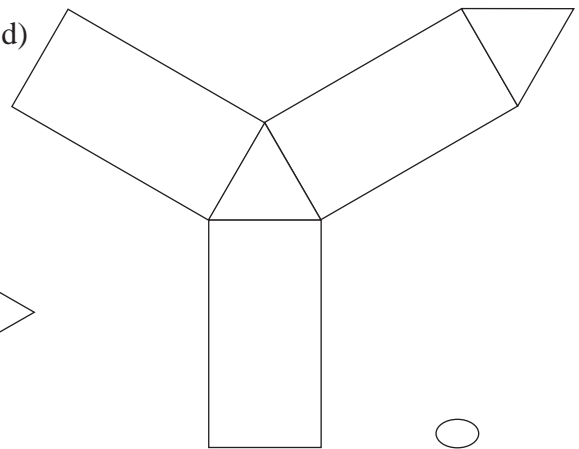
b)



c)



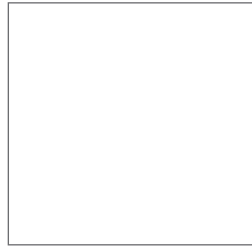
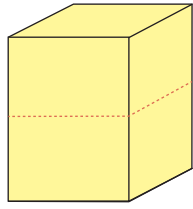
d)



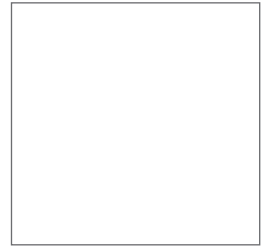
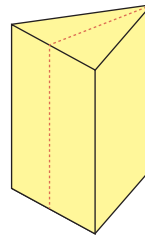
 **Exercise 11.6**

1. Draw the shape resulting from the following cuts.

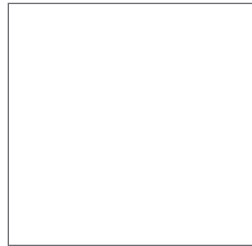
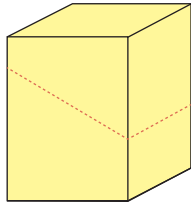
a)



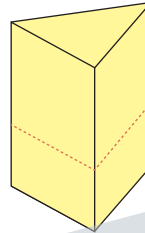
b)



c)



d)



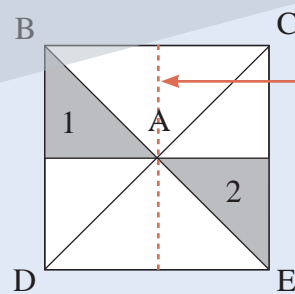
 **EXAMPLE 7:**

What fraction of the whole square is the shaded area?



Solution:

Because A is the central point of the square, triangles 1 and 2 have the same area.



Divide the square into 8 equal triangles, thus the shaded area is $\frac{2}{8}$ or $\frac{1}{4}$.

Thus, the required area is equal to the area of triangle ABD.

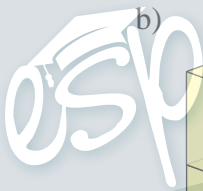
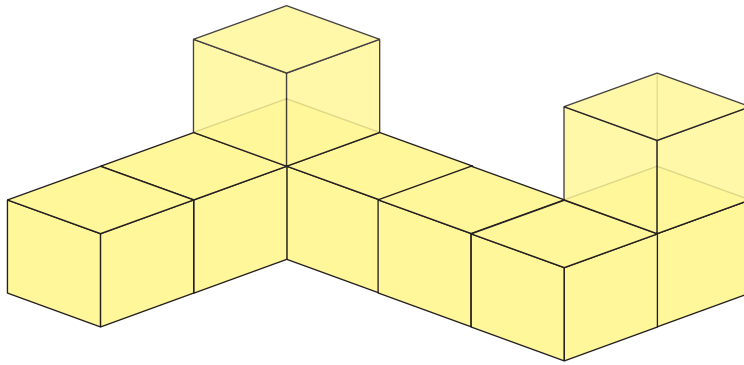
\therefore The shaded area is $\frac{1}{4}$ of the whole.



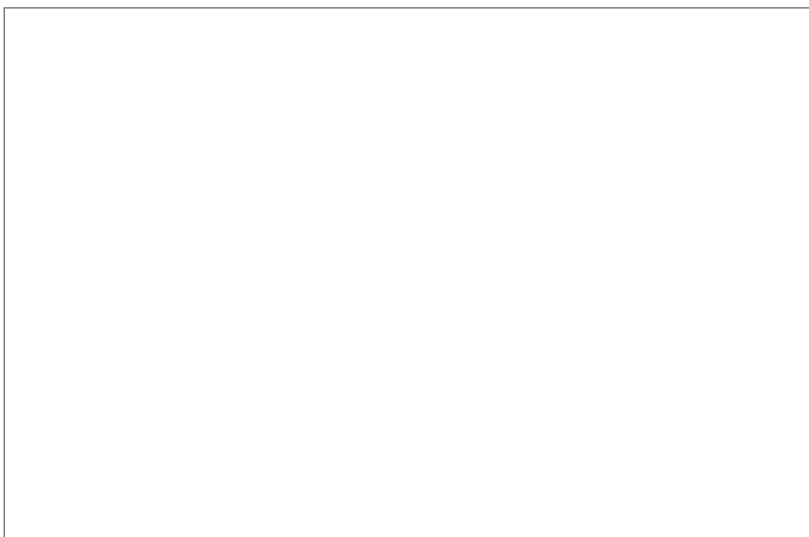
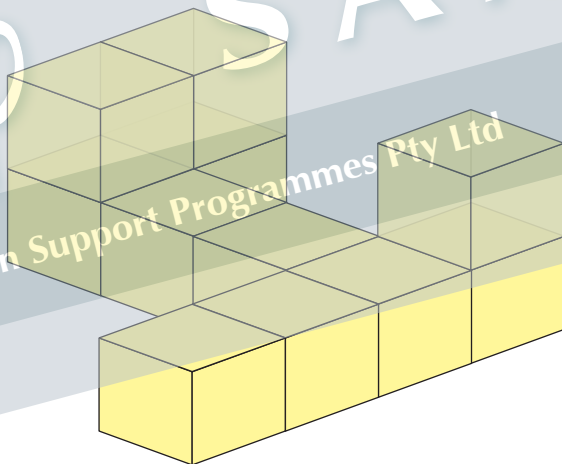
Exercise 11.8

1. Draw a top view of the following shapes.

a)



b)



NAPLAN-style Numeracy Tests

Remember to use a 2B pencil only.

TEST ONE



(with calculator)

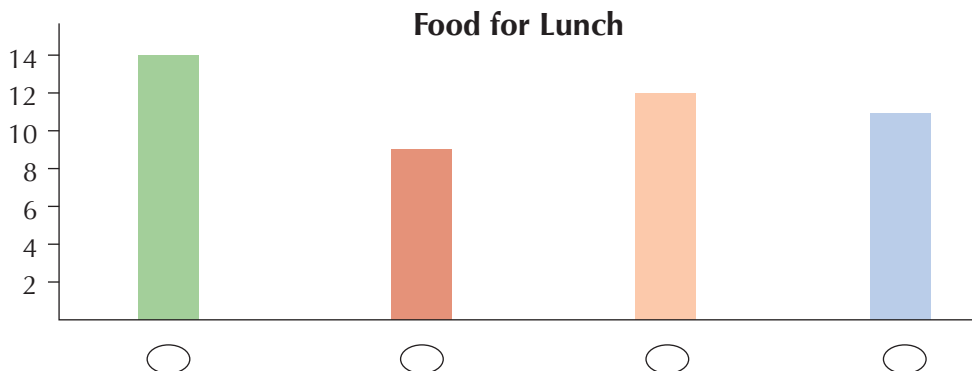
- 1 Sarah decides to exercise for 7 hrs each week. The following is a table of the time she has spent each day. How many minutes must she exercise on Sunday to reach her goal?

Monday	65 mins
Tuesday	30 mins
Wednesday	54 mins
Thursday	28 mins
Friday	70 mins
Saturday	50 mins
Sunday	

- 2 For five days Jason records the type of food his friends bring for lunch. The table below shows the results.

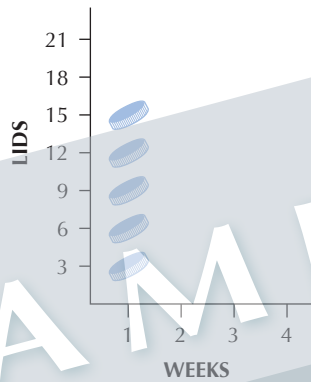
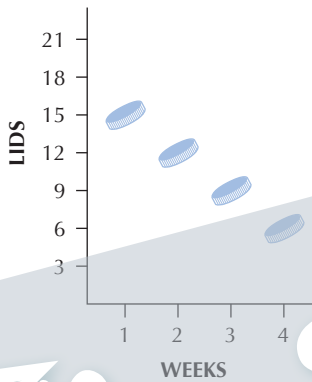
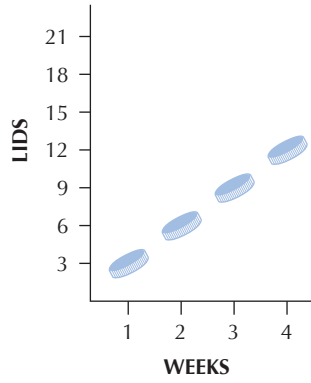
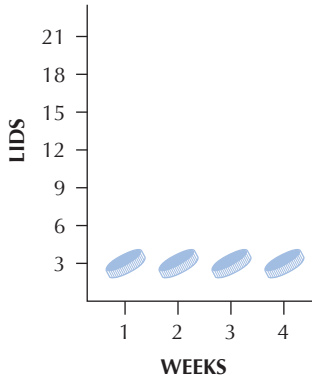
Type of Food	Monday	Tuesday	Wednesday	Thursday	Friday
Sandwich	|||	||||	||	||||	|
Cake	||	|	||||	|	|||
Snack Pack	|||	|||	|||	|||	||
Fruit	||	|||	|	||	||

Which column of the graph shows the total number of cakes?



Use the data in question 14 to answer questions 15 and 16.

14 John collects milk bottle lids. His family uses the same number of lids each week. He decides to graph his progress. Which graph shows John's total for the first 4 weeks?

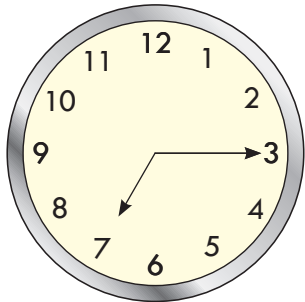


15 What will be the exact total of lids collected by John by the end of week 7?

lids

16 If he already had 14 lids before he started his regular weekly collection, an equation which would show the relationship between weeks (w) and lids (l) would be

17



The angle between the hour and minute hand is

90°

130°

150°

120°

23 Sam travels 550 km in $10\frac{1}{2}$ hrs. If he travels at the same speed, how far (to the nearest km) will he travel in 12 hrs?

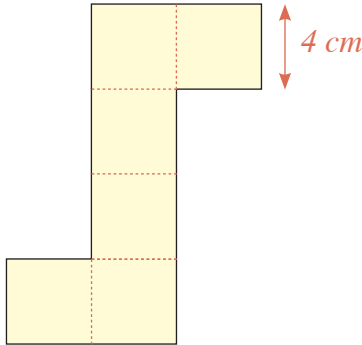
660

481

629

528

24 This shape is made of 6 squares.



The perimeter of the shape is

96 cm

60 cm

64 cm

56 cm

25 The value of $\frac{30.256 - 13.23}{2.054}$ is nearest to

8.3

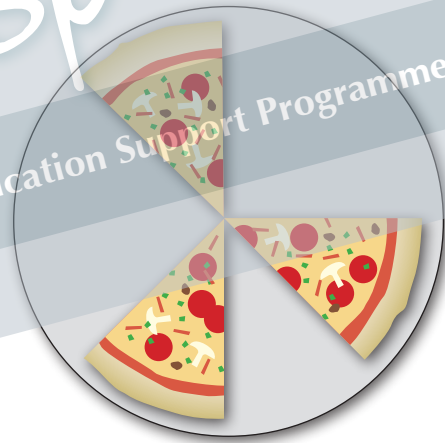
23.8

13.2

8.29



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What fraction of the whole pizza is left?

$\frac{6}{16}$

$\frac{11}{16}$

$\frac{7}{8}$

$\frac{4}{8}$

27 Sandra's orange tree produced 240 oranges this year. This was 80% of last year's crop. Last year's crop was

300

192

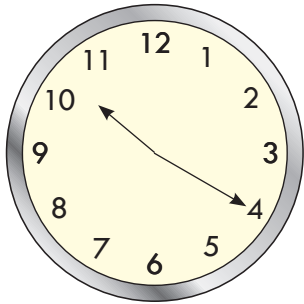
160

320

TEST TWO

(without calculator)

1



The time on the clock is 10.20 a.m.
In 350 minutes the time will be

(remember to include a.m. or p.m.)

2 Find the number which is halfway between $1\frac{1}{2}$ and $3\frac{3}{4}$.

3 Lena plays netball in the local netball competition. There are eight teams in the competition. If each team plays the other teams twice, how many games will Lena play before the semifinals?

16

14

8

7

The next two questions refer to the table below.

Location	Adelaide	Alice Springs	Brisbane	Cairns	Canberra	Darwin	Melbourne	Perth	Sydney
Adelaide	–	1533	2044	3143	1204	3042	728	2725	1427
Alice Springs	1533	–	3100	2500	2680	1489	2270	3630	2850
Brisbane	2044	3100	–	1718	1268	3415	1669	4384	1010
Cairns	3143	2500	1718	–	2922	3100	3387	5954	2730
Canberra	1204	2680	1268	2922	–	3917	647	3911	288
Darwin	3042	1489	3415	3100	3917	–	4045	4250	3991
Melbourne	728	2270	1669	3387	647	4045	–	3430	963
Perth	2725	3630	4384	5954	3911	4250	3430	–	4110
Sydney	1427	2850	1010	2730	288	3991	963	4110	–

4 Alice and Brian take a holiday in a campervan. They travel from Brisbane to Sydney to Melbourne to Adelaide to Alice Springs to Darwin.

The distance they travel is

5 The closest city to Alice Springs is

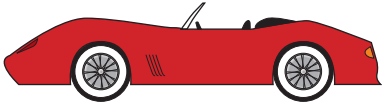
Adelaide

Perth

Melbourne

Darwin

6



This scale model of a car is 5 cm long. The actual length of the car is 5 m.
The scale used in the model is

1 : 1



1 : 10



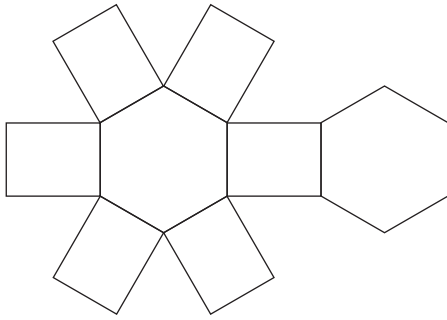
1 : 100



1 : 1000



7 Fiona made a net.



What 3D object would it make?



hexagonal pyramid



pentagonal pyramid

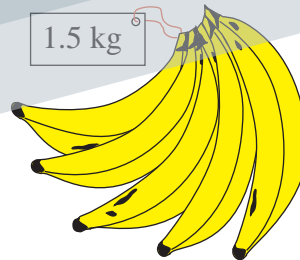
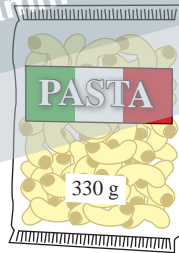


hexagonal prism



octagonal prism

8 Steve's plastic shopping bag contained



(remember 1 L weighs 1 kg)

The total weight was closest to

2 kg



3 kg



4 kg



5 kg



9 If \$1 Australian buys \$1.10 American, then \$250 Australian would buy how many American dollars?

227



255



265



275



14 A student worked out the problem below and made errors.

$$b = \frac{a^2 - 3a + 4}{2}$$

if $a = 3$, $b = \frac{3 - 9 + 4}{2}$ ①

$$= \frac{12 + 4}{2}$$
 ②

$$= \frac{16}{2}$$
 ③

$$= 8$$
 ④

He has made 2 errors in his calculations. They are in lines






1 and 2

1 and 3

2 and 3

1 and 4

15 A survey of cars travelling over the West Gate Bridge in a 5-minute period revealed the following information:

Country of Manufacture	Number of Cars
Australia	
Japan	
America	
France	
Germany	

Key:  = 8 cars

The number of Japanese cars exceeded the number of Australian cars by

24

20

3

18

16 $8 - 2(3 + 2) + 6$ equals

36

8

4

24

17 If two 20¢ coins are spun in the air together, the chance that both will come down heads is

$\frac{1}{4}$

$\frac{1}{2}$

















































$\frac{3}{4}$

$\frac{1}{8}$

18 Isabel is 10 years 3 months. Her brother Ben is 1 year 9 months.
How much older is Isabel than Ben?

9 years 6 months 9 years 3 months 8 years 3 months 8 years 6 months

19 Below is a table of possible results when two 6-sided dice are rolled together.

How many times would it be possible to get a total of seven?

4

5

6

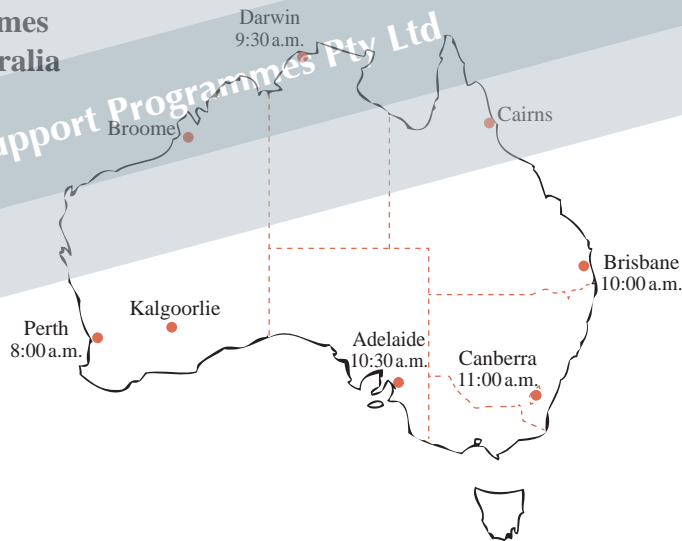
7

The next two questions refer to the map below.



Summer Times
across Australia

Education Support Programmes Pty Ltd



20 A cricket match started at 11.00 a.m. in Perth. At what time in Adelaide did viewers see the match start?

5.30 a.m.

1.30 p.m.

5.30 p.m.

1.30 a.m.

21 A plane takes off from Brisbane at 8.15 p.m. and lands in Perth at 12.10 a.m.

How long did the flight take?

25 Which is the heaviest weight?

650 kg

.639 tonnes

65 000 g

6.39 kg

26 $36.2 \times .1 =$

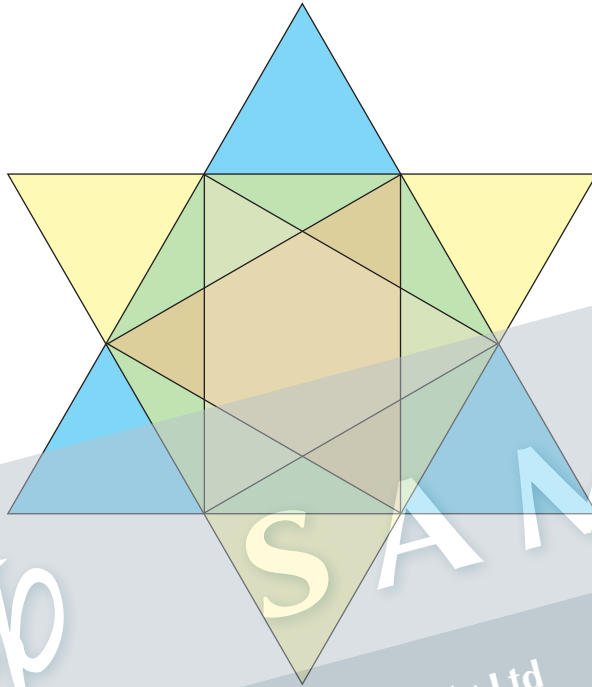
.362

3.62

36.2

362

27 How many lines of symmetry does this figure have?



12

10

8

6

28 Which percentage is equal to $\frac{10}{16}$?

$37\frac{1}{2}\%$

50%

$62\frac{1}{2}\%$

$87\frac{1}{2}\%$

29 **3** **4** **9** **25** **200** are arranged using basic operations to equal **578**.

The required arrangement is

\times $-$ \times $+$