

Newington College



Mid Year Examination 2013

YEAR 8 MATHEMATICS

Time allowed: 90 minutes

NAME: _____ Teacher: _____

- Outcomes being assessed:
1. Factorises simple algebraic expressions and uses this to simplify simple algebraic fractions.
 2. Operates with percentages.
 3. Uses algebraic techniques to solve linear equations and simple inequalities.
 4. Uses and applies Pythagoras' Theorem.
 5. Constructs, reads and interprets graphs, tables, chart and statistical information.

Directions to candidates

All questions may be attempted.

In each question, show all necessary working.

The use of hand-held non-programmable calculators is permitted.

Marks will be deducted for careless or badly arranged work.

Outcome	Mark
Algebra	/20
Percentages	/20
Equations	/30
Pythagoras' Theorem	/20
Data	/10
Total	/100

Teacher's Comment:

Student's Comment:

SECTION 1

ALGEBRA

20
Marks

10

1. Simplify these expressions:

(a) $7m - m$

(b) $5xy - 8yx$

(c) $x + y$

(d) $2 \times m \times 3 \times k$

(e) $4p \times 2p$

(f) $x^6 \div x^2$

(g) $5t^3 \times 2ty$

(h) $(3y^2)^3$

(i) $4m^2 \div 8m^3$

(j) $-\frac{abc^2}{bc}$

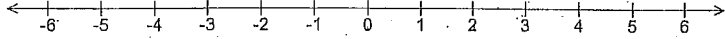
<p>2. Factorise fully.</p> <p>(a) $5py + 10y$</p>	<p>2</p>
<p>(b) $-my^2 - m^2y^3$</p>	
<p>3. Simplify $\frac{8k^2x}{12k \times 6y^2}$</p>	<p>2</p>
<p>4. Expand and simplify $5(4 + 2x) - 3(x - 6)$</p>	<p>2</p>
<p>5. Simplify $\frac{2p}{7} + \frac{p}{2}$</p>	<p>2</p>
<p>6. Simplify completely $\frac{9n}{n+1} \times \frac{2+2n}{3n^2}$</p>	<p>2</p>

SECTION 2 PERCENTAGES	20 Marks
<p>1. Convert $\frac{2}{5}$ to a percentage.</p>	<p>2</p>
<p>2. Find 17% of 500kg.</p>	<p>1</p>
<p>3. Convert 3% to a decimal.</p>	<p>1</p>
<p>4. Convert to a fraction in simplest form:</p> <p>(a) 8%</p> <p>(b) 11.5%</p>	<p>1</p> <p>1</p>
<p>5. Increase 340 by 25%.</p>	<p>2</p>
<p>6. Jakes attendance for the previous term was 85%. If there was 60 days in the term, how many did he attend?</p>	<p>2</p>

7. Express 16 hours out of 4 days as a percentage (Give your answer correct to 1 decimal place)	2
8. Simon is organising a dinner. 15 of those attending are vegetarians. If this is 30% of the total number who are coming to the meal, how many people attended?	2
9. A second hand car is on sale for 12% less than its recommended retail price of \$10000. A customer views the car and notices some damage to the paint work and is offered a further 5% discount on the reduced price. Find the total discount now being offered on the vehicle.	2
10. April is paid a weekly retainer of \$150 plus a commission based on the value of her sales. In a week her sales total \$7194, she is paid \$1157.16. Find her rate of commission as a percentage.	3

SECTION 3 EQUATIONS, INEQUALITIES AND FORMULAE	30 Marks
1. Solve the following equations: (a) $n - 6 = 9$	1
(b) $3p = 27$	1
(c) $\frac{m}{5} = -3$	1
(d) $8 + 2y = 2$	2
(e) $5 = 2(k + 1)$	2
(f) $\frac{x-1}{2} = \frac{1}{4}$	2

2. Graph the solution of $x \geq -3$ on this number line.



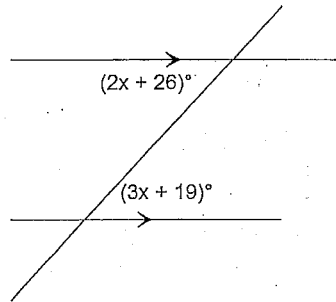
2

3. Find the value of R if $R = \frac{4}{x} + \frac{2}{y}$, $x = -3$ and $y = 4$.

2

4. Form an equation and solve it to find the value of x

3



5. A number is doubled and then increased by 6. The result is 42.

3

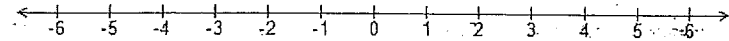
- (i) Form an equation by letting the number be x
- (ii) Solve the equation to find the number.

6. A rectangle is twice as long as it is wide. If the perimeter is 144 cm, form an equation and solve it to find the dimensions of the rectangle.

3

7. Solve for x : $4x + 3 < 19$ and graph your solution on a number line.

3



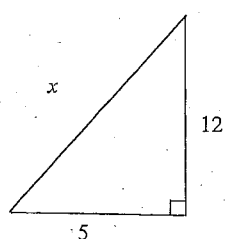
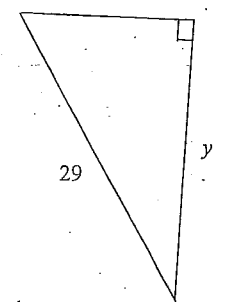
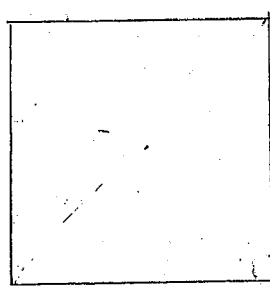
8. The formula $F = \frac{9}{5}C + 32$ is used to convert temperatures in degrees Celsius (C) to temperatures in degrees Fahrenheit (F). Find the temperature in degrees Celsius for -25° Fahrenheit.

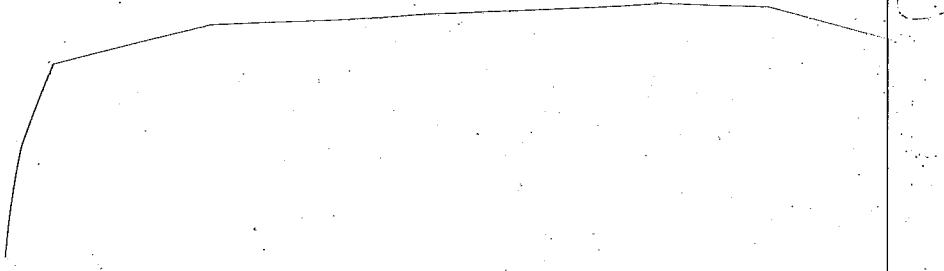
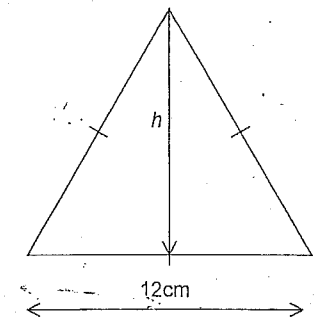
2

9. Solve the equation

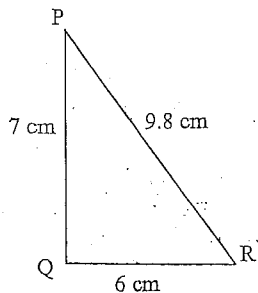
$$\frac{x-1}{3} - \frac{1-2x}{5} = \frac{1}{2}$$

3

SECTION 4 PYTHAGORAS' THEOREM	20 Marks
<p>1. Calculate the value of the pronumeral:</p> <p>(a) </p> <p>(b) </p>	4
<p>2. A square has length 5cm. Calculate the length of one of the diagonals, correct to 1 decimal place.</p> 	3

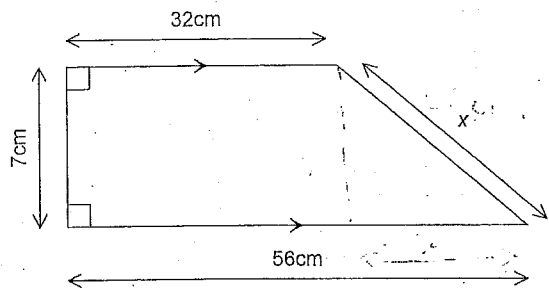
<p>3. John and Scott set off running from the same starting point. John runs 800m due North before stopping, and Scott runs 1.5km due West then stops. How far are they apart from each other when they finish?</p> 	3
<p>4. Find the height (h) of the equilateral triangle below correct to 1 decimal place.</p> 	2

5. Show why $\triangle PQR$ is not a right angled triangle



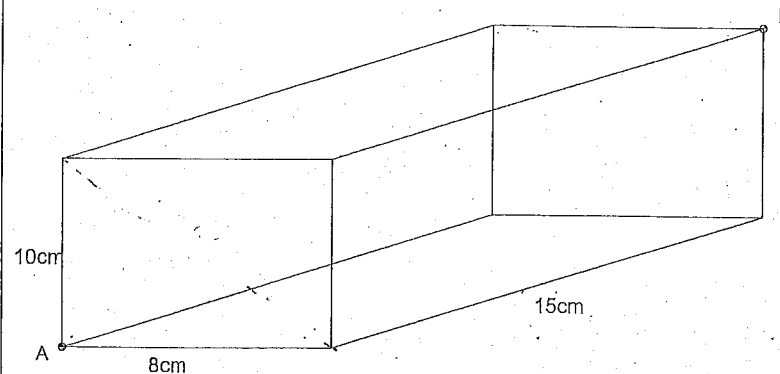
2

6. Find the perimeter of the shape below.



3

7. Harry Potter's rectangular wand box has dimensions 8cm by 10cm by 15cm. The wand fits in exactly from A to B. How long is the wand correct to 1 decimal place?



3

SECTION 5 DATA REPRESENTATION 10 marks

1. Classify the following data as categorical or quantitative.

a) Distance travelled during a swim

b) Favourite film

2. The graph below shows the number of bottles recycled by a student in a particular week.

Bottles for Recycling	
Green	
Brown	
Clear	

If he collected 36 bottles in all, how much does represent?

3. From a survey on favourite fruit the following divided bar graph was created (Diagram not to scale):

Apples	Kiwi fruit	Orange	Pear	Banana
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← 16cm →

(a) Which fruit was the most popular?

(b) The Apple section is 24mm long. If 12 people chose Apple as their favourite fruit, how many mm represent 1 person.

(c) How many people in were surveyed in total?

4. The graph below shows the types of pets owned by children in year 6. How many Hamsters and Cats are there altogether?

1

Pets Survey

Type of Pet	Number of Children
Dog	15
Cat	10
Parrot	2
Horse	4
Hamster	5
Fish	12

5. The line graph below shows the monthly sales of a company from April to November.

Monthly Sales

Month	Sales
April	200
May	600
June	500
July	900
August	700
Sept	300
Nov	100

(a) In which month were the most sales made?

(b) By how much did the sales increase from April to July?

1

1

END OF EXAMINATION

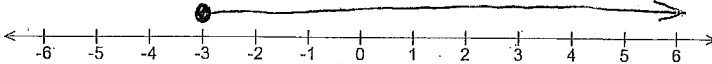
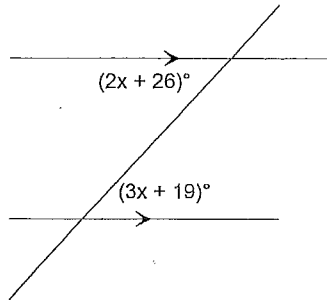
SECTION 1	ALGEBRA	20 Marks
1. Simplify these expressions:		10
(a) $7m - m$	$6m$ /	
(b) $5xy - 8yx$	$-3xy$ /	
(c) $x + y$	$\frac{x}{y}$ /	
(d) $2 \times m \times 3 \times k$	$6km$ /	
(e) $4p \times 2p$	$8p^2$ /	
(f) $x^6 \div x^2$	x^4 /	
(g) $5t^3 \times 2ty$	$10t^4y$ /	
(h) $(3y^2)^3$	$27y^6$ /	
(i) $4m^2 \div 8m^3$	$\frac{1}{2m}$ /	
(j) $-\frac{abc^2}{bc}$	$-ac$ /	

2. Factorise fully.		2
(a) $5py + 10y$	$5y(p+2)$ /	
(b) $-my^2 - m^2y^3$	$-my^2(m^2y + 1)$ /	
3. Simplify	$\frac{8k^2x}{12k \times 6y^2} = \frac{8k}{9y} = \frac{k}{9y}$ /	2
4. Expand and simplify	$5(4+2x) - 3(x-6)$ $20 + 10x - 3x + 18 = 7x + 38$ /	2
5. Simplify	$\frac{2p}{7} + \frac{p}{2}$ $\frac{4p+7p}{14} = \frac{11p}{14}$ /	2
6. Simplify completely	$\frac{9n}{n+1} \times \frac{2+2n}{3n^2} = \frac{3(3n) \times 2(n+1)}{(n+1) \times n(3n)} = \frac{6}{n}$ $\frac{3n^2(9n) \times n(2+2n)}{3n^2(n+1)}$ $\frac{9n \times (2+2n)}{1}$ $= 18n + 18n^2$ X	2

SECTION 2	PERCENTAGES	20 Marks
1. Convert $\frac{2}{5}$ to a percentage.	$\frac{2}{5} \times 100 = 40$ $= 40\%$	2
2. Find 17% of 500kg.	$17\% \times 500\text{kg} = 85\text{kg}$	1
3. Convert 3% to a decimal.	0.03	1
4. Convert to a fraction in simplest form:	<p>(a) $8\% = \frac{8}{100} = \frac{4}{50} = \frac{2}{25}$</p> <p>(b) $11.5\% = \frac{23}{200}$</p>	1 1
5. Increase 340 by 25%.	$\frac{25}{100} \times 340 = 85$ $340 + 85 = 425$	2
6. Jakes attendance for the previous term was 85%. If there was 60 days in the term, how many did he attend?	$\frac{85}{100} \times 60 = 51$ <p>Jake attended school 51 days of the term.</p>	2

7. Express 16 hours out of 4 days as a percentage (Give your answer correct to 1 decimal place)	$\frac{16}{96} \times 100 = 16.67 \text{ (1dp)}$ $16.7\% \text{ (1dp)}$	2
8. Simon is organising a dinner. 15 of those attending are vegetarians. If this is 30% of the total number who are coming to the meal, how many people attended?	<p>Unitary Method</p> <p>30% = .15</p> <p>1% = 0.005</p> <p>100% = 0.5</p> <p>← can't have 0.5 of a person</p> <p>1 person attended</p>	2
9. A second hand car is on sale for 12% less than its recommended retail price of \$10000. A customer views the car and notices some damage to the paint work and is offered a further 5% discount on the reduced price. Find the total discount now being offered on the vehicle.	$12\% \times \$10000 = 1200$ $10000 - 1200 = 8800$ $5\% \times 8800 = 440$ $8800 - 440 = 8360$ <p>\$8360 offered</p>	2
10. April is paid a weekly retainer of \$150 plus a commission based on the value of her sales. In a week her sales total \$7194, she is paid \$1157.16. Find her rate of commission as a percentage.	$1157.16 - 150 = 1007.16 = \text{commission}$ $\frac{1007.16}{7194} \times 100 = 14$ <p>commission = 14% of total sales</p>	3

SECTION 3 EQUATIONS, INEQUATIONS AND FORMULAE	30 Marks
<p>1. Solve the following equations:</p> <p>(a) $n - 6 = 9 + 6$ $n = 15$</p>	1
<p>(b) $3p = 27$ $p = 9$</p>	1
<p>(c) $\frac{m}{5} = -3$ $m = -15$</p>	1
<p>(d) $8 + 2y = 2$ $2y = -6$ $y = -3$</p>	2
<p>(e) $5 = 2(k+1)$ $5 = 2k + 2$ $3 = 2k$ $k = \frac{3}{2}$</p>	2
<p>(f) $2x - 1 = \frac{1}{4} \times 4$ $x = 3$</p> <p>$4(x-1) = 1 \Rightarrow x-2 = \frac{1}{4}$ $4x-4 = 1$ $4x = 5$ $x = \frac{5}{4}$</p> <p>$4(x-1) = 1 \times 2$ $4x-4 = 2$ $4x = 6$ $x = \frac{3}{2}$</p>	2

<p>2. Graph the solution of $x \geq -3$ on this number line.</p> 	2
<p>3. Find the value of R if $R = \frac{4}{x} + \frac{2}{y}$, $x = -3$ and $y = 4$.</p> <p>$R = \frac{4}{-3} + \frac{2}{4}$ $R = -\frac{4}{3} + \frac{1}{2}$ $R = -\frac{8}{6} + \frac{3}{6}$ $R = -\frac{5}{6}$</p>	1
<p>4. Form an equation and solve it to find the value of x</p>  <p>$(2x + 26) = (3x + 19)$ $2x + 26 = 3x + 19$ $-2x \quad -2x$ $26 = x + 19$ $-19 \quad -19$ $x = 7$</p>	3
<p>5. A number is doubled and then increased by 6. The result is 42.</p> <p>(i) Form an equation by letting the number be x $2x + 6 = 42$</p> <p>(ii) Solve the equation to find the number. $2x + 6 = 42$ $-6 \quad -6$ $2x = 36$ $\div 2 \quad \div 2$ $x = 18$ number = 18</p>	3

7

6

9

6. A rectangle is twice as long as it is wide. If the perimeter is 144 cm, form an equation and solve it to find the dimensions of the rectangle.

Length = L Width = W Width = 24m Length = 48cm

$L = 2W$ ~~Equation~~

~~4W~~ $2W + W = 72$ ~~Equation~~

$3W = 72$

$W = 24$ ✓

3

7. Solve for x: $4x + 3 < 19$ and graph your solution on a number line.

$4x + 3 < 19$

$-3 \quad -3$

$4x < 16$

$\div 4 \quad \div 4$

$x < 4$

3

8. The formula $F = \frac{9}{5}C + 32$ is used to convert temperatures in degrees Celsius (C) to temperatures in degrees Fahrenheit (F). Find the temperature in degrees Celsius for -25° Fahrenheit.

$-25 = \frac{9}{5}C + 32$

$-32 \quad -32$

$-57 = \frac{9}{5}C$

$\times 5 \quad \times 5$

$-285 = 9C$

$C = -31.67$ (2dp)

$C = -31.67^\circ$ ✓

2

9. Solve the equation

$\frac{x-1}{3} - \frac{1-2x}{5} = \frac{1}{2}$

$\frac{5(x-1) - 3(1-2x)}{15} = \frac{1}{2}$

$15 \times 15 \quad 2 \times 15$

$50x - 5 - 3 + 6x = \frac{15}{2}$ ✓

$11x - 8 = \frac{15}{2}$

$\times 2 \quad \times 2$

$22x - 16 = 15$

$+16 \quad +16$

$22x = 31$

$\div 22 \quad \div 22$

$x = \frac{31}{22}$ ✓

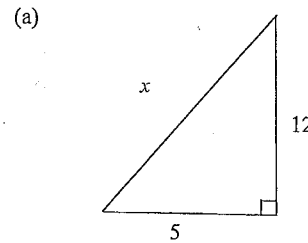
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7 well done

SECTION 4 PYTHAGORAS' THEOREM

20 Marks

1. Calculate the value of the pronumeral:

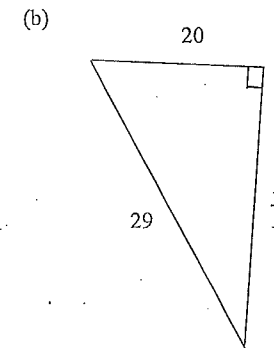


$x^2 = 5^2 + 12^2$

$x^2 = 25 + 144$

$x^2 = 169$

$x = 13$ ✓



$29^2 = 20^2 + y^2$

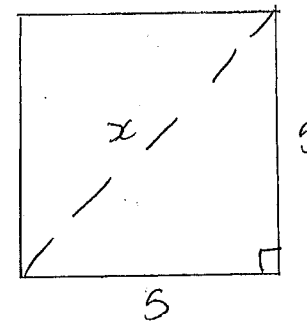
$841 - 400 = y^2$

$441 = y^2$

$y = 21$ ✓

4

2. A square has length 5cm. Calculate the length of one of the diagonals, correct to 1 decimal place.



$x^2 = 5^2 + 5^2$

$x^2 = 25 + 25$

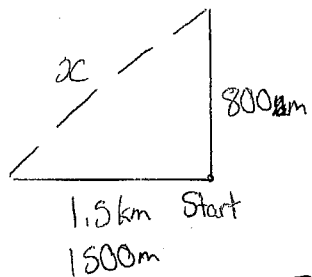
$x^2 = 50$ ✓

$x = 7.1$ cm (1dp)

3

7

3. John and Scott set off running from the same starting point. John runs 800m due North before stopping, and Scott runs 1.5km due West then stops. How far are they apart from each other when they finish?



$$x^2 = 800^2 + 1500^2$$

$$x^2 = 640\,000 + 2\,250\,000$$

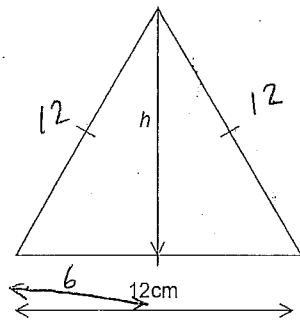
$$x^2 = 2\,890\,000$$

$$x = 1700$$

1700m apart ✓

3

4. Find the height (h) of the equilateral triangle below correct to 1 decimal place.



$$12^2 = 6^2 + h^2$$

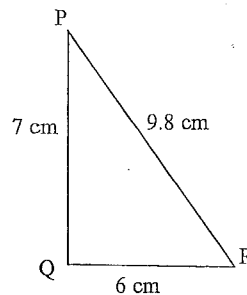
$$144 - 36 = h^2$$

$$h^2 = 108$$

$$h = 10.4 \text{ cm (1 d.p.)}$$

2

5. Show why $\triangle PQR$ is not a right angled triangle



$$9.8^2 \neq 7^2 + 6^2$$

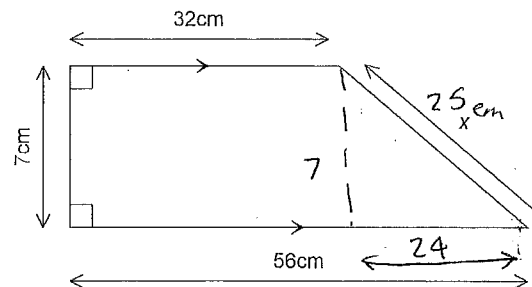
$$96.04 \neq 49 + 36$$

$$96.04 \neq 85$$

The hypotenuse square does not equal the shorter sides squares. Therefore, it is not right angled.

2

6. Find the perimeter of the shape below.



$$56 - 32 = 24$$

$$x^2 = 24^2 + 7^2$$

$$x^2 = 576 + 49$$

$$x^2 = 625$$

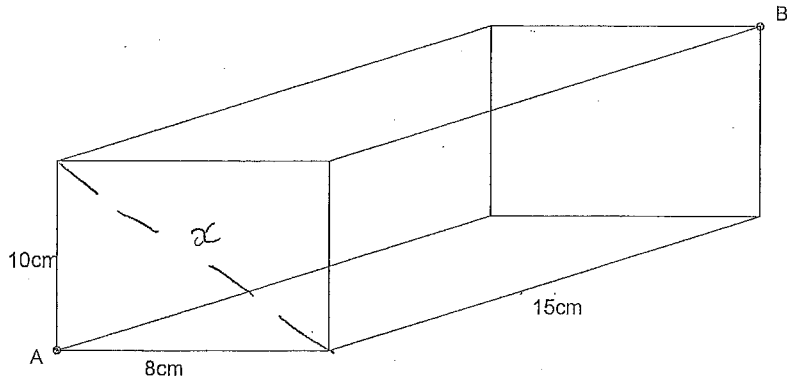
$$x = 25$$

$$\text{Perimeter} = 120 \text{ cm}$$

$$32 \text{ cm} + 7 \text{ cm} + 56 \text{ cm} + 25 \text{ cm} = 120 \text{ cm}$$

3

7. Harry Potter's rectangular wand box has dimensions 8cm by 10cm by 15cm. The wand fits in exactly from A to B. How long is the wand correct to 1 decimal place?



$$x^2 = 10^2 + 8^2$$

$$x^2 = 100 + 64$$

$$x^2 = 164$$

$$x = 12.8 \text{ (1 dpl)}$$

$$x = 12.80624847 \text{ Calculator display}$$

$$AB^2 = 15^2 + 12.8^2$$

$$AB^2 = 225 + 163.84$$

$$AB^2 = 388.84$$

$$AB = 19.7 \text{ cm (1 dpl)}$$

Harry Potters wand is 19.7cm long.

3

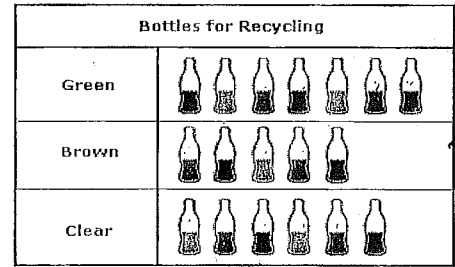
SECTION 5 DATA REPRESENTATION 10 marks

1. Classify the following data as categorical or quantitative.

- a) Distance travelled during a swim *quantitative*
- b) Favourite film *categorical*

2

2. The graph below shows the number of bottles recycled by a student in a particular week.

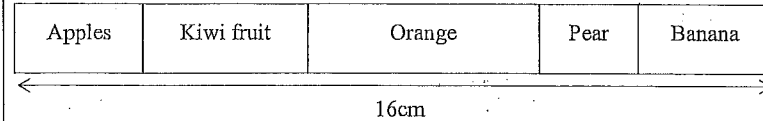


18 bottles
 ← 1 bottle = 2 bottles

If he collected 36 bottles in all, how much does represent?

1

3. From a survey on favourite fruit the following divided bar graph was created (Diagram not to scale):



- (a) Which fruit was the most popular?
Orange
- (b) The Apple section is 24mm long. If 12 people chose Apple as their favourite fruit, how many mm represent 1 person?
2mm = 1 person
- (c) How many people in were surveyed in total?
80 people

1

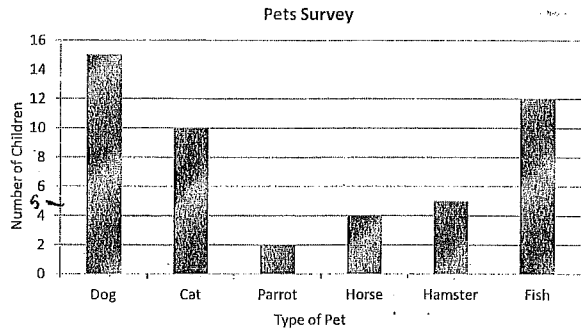
1

2

7

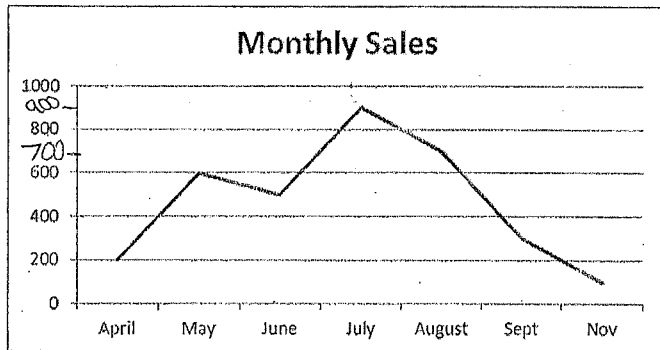
4. The graph below shows the types of pets owned by children in year 6. How many Hamsters and Cats are there altogether?

1



15 ~~hamsters and cats together~~

5. The line graph below shows the monthly sales of a company from April to November.



- (a) In which month were the most sales made?

July

- (b) By how much did the sales increase from April to July?

700

END OF EXAMINATION

1
1

3