



Mathematics

YEAR 8 ASSESSMENT 3

OCTOBER 2016

Name _____ Teacher _____

- Instructions : * Time allowed: 70 minutes * Show necessary working.
- * Use a pen only and a ruler for straight lines.
- * Full marks cannot be given for illegible writing.

TOTALS					
Number	Question 1	/14	Q6 a)	/2	/16
Algebra/Number Plane	Question 2	/14	Q6 b)	/2	/16
Equations	Question 3	/14	Q6 c)	/2	/16
Graphs/Statistics	Question 4	/14	Q6 d)	/2	/16
Measurement/Geometry	Question 5	/14	Q6 e)	/2	/16

QUESTION 1 (14 marks) NUMBER.

ANSWERS

a) Simplify the ratio 1 km : 300 m

b) Express i) $8\frac{1}{2}\%$ as a decimal

ii) $1\frac{3}{5}$ as a percentage

c) Reduce \$700 by 28%

d) Find the value of x if $\frac{3}{4} = \frac{5}{x}$

e) In a class there are 18 boys and 12 girls. If 4 more girls arrive, how many extra boys are needed to keep to the original ratio?

f) Convert the rate 8 m/s to : i) m/minute

ii) km/h

g) Car A has an average fuel consumption of 7.5 L/100 km, whilst car B has an average consumption of 9 L/100 km. They both travel 500 km.

i) How much more fuel does car B use compared to car A?

ii) How far can car A travel on 60 litres?

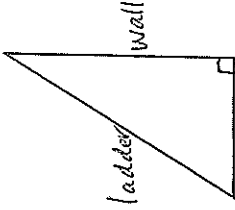
h) Find the value of x in exact form.



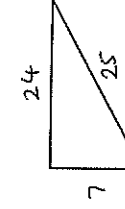
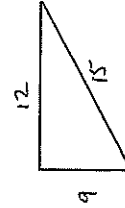
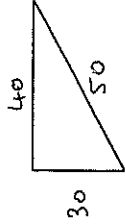
i) A ladder, 7 m long and on level ground, leans against a vertical wall.

The base of the ladder is placed 2m out from the base of the wall.

How far does the ladder reach up the wall, correct to 1 dec. place?



j) The triangles below are not drawn to scale. Circle all the triangles which cannot be right-angled.



k) If 15% of an item is \$21, find the item's full price.

QUESTION 2 (14 marks) ALGEBRA / NUMBER PLANE

a) Fully simplify :

i) $4a^2 + 3a - a^2 + 5a$

ii) $6 \times m \times 4a \div 2m$

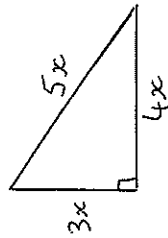
iii) $(4ab)^2 \times 2a^3b$

h) Find the value of x in exact form.

b) For this shape, find a simple expression for the :

i) perimeter P _____

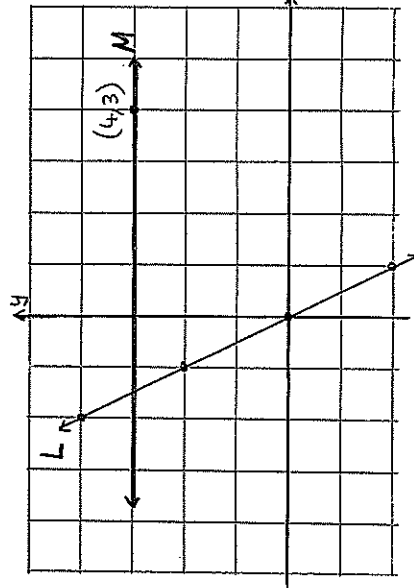
ii) area A _____



c) Fully factorise $6x^2 - 9xy$ _____

d) If $f(x) = 4x + 2x^2$, find $f(3)$ _____

e) Simplify : i) $\frac{2a}{3} + \frac{a}{4}$ _____
 ii) $\frac{2ab}{3} \div \frac{b}{6}$ _____



i) Complete this table of values for line L:

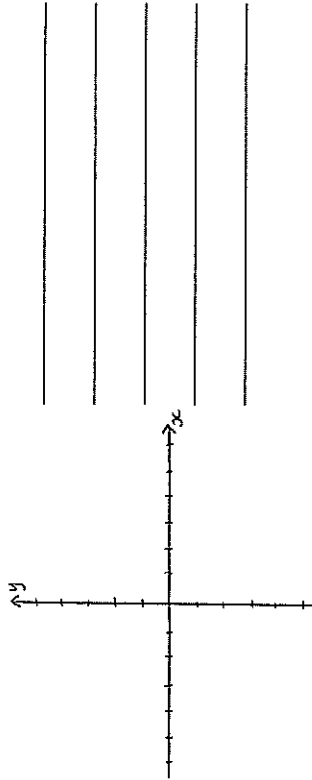
x	y

ii) Write the rule for the table above. _____

iii) Write the equation for line M _____

iv) On the number plane above, graph the line $y = 2x - 2$. Use a ruler. _____

g) Plot the points A(-2,5) and B(4,-3) below and find the length AB. _____



QUESTION 3 (14 marks) EQUATIONS / INEQUALITIES / FORMULAE

a) Solve each equation :

i) $m - 6 = -2$ _____

ii) $\frac{2x-3}{4} = 0$ _____

iii) $8(a - 1) = 4(3a + 2)$ _____

b) To solve the inequality $2 - 4x \geq 12 + 3x$, an incorrect solution is shown below.

Which line 1, 2, 3 or 4 first contains an error?

$-4x \geq 10 + 3x$ 1

$-7x \geq 10$ 2

$x \geq \frac{10}{-7}$ 3

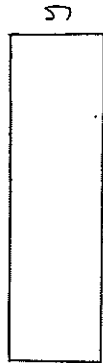
$x \geq -1\frac{3}{7}$ 4

Answer _____

c) Solve this inequation : $x + \frac{x}{4} < 5$

1

d) Let the width of the rectangle below be y cm. The rectangle is five times longer than it is wide.



i) Write a simple expression for the rectangle's length in terms of y .

ii) The perimeter of the rectangle is 66 cm.

Write and solve an equation and then

find the area of the rectangle.

2

e) The sum of a certain number and six

is the same as three less than twice the number. Write and solve an equation to find the number.

2

f) If $v = u + at$, find v when $u = 2$, $a = 3$, $t = 4$.

1

g) $C = \frac{5}{9}(F - 32)$ is the formula connecting temperature in degrees Fahrenheit with degrees

Celsius. Use this formula to :

i) find C when $F = 167$

ii) find F when $C = 40$

2

h) "Young's Rule" is used to calculate a child's medicine dose.

It is $C = \frac{nA}{n+12}$, where : C is the child's dose in mL

n is the child's age in years

A is the adult's dose in mL

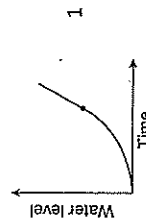
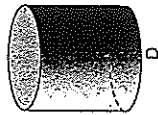
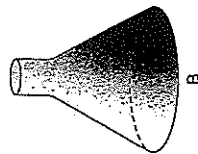
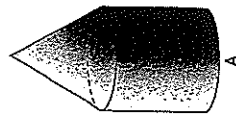
The adult dose is 30 mL. Find the dose for a child aged 12 years old.

1

1

QUESTION 4 (14 marks) GRAPHS / STATISTICS

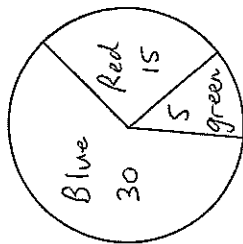
a) Each container shown below was filled with water at a steady rate. When the level of water in one of the containers was plotted, the graph was obtained. Which container does the graph show?



1

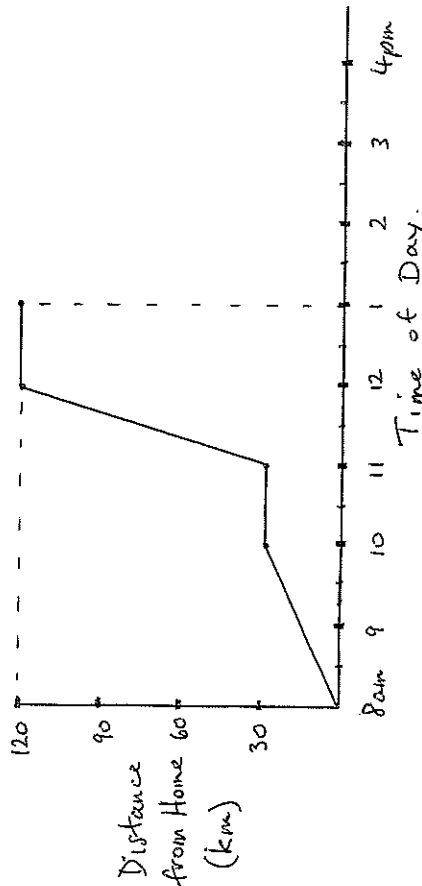
Answer

- b) A group of 50 people was surveyed about their favourite colour. The results are shown in the sector graph below. The sectors are not drawn with the correct angles.



What should the correct angle be for "Blue"? 1

- c) This travel graph shows Irene's journey.



Draw a straight line with a ruler that shows Irene returns home at an average speed of 80 km/h.

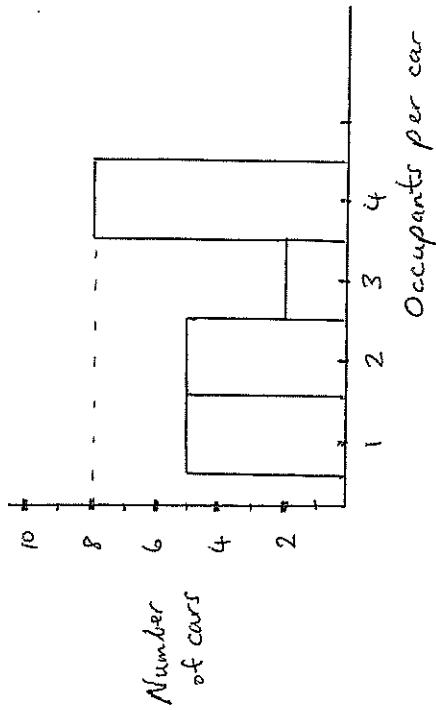
- d) A table for a set of scores is shown.

Score	Frequency	fx
3	4	
4	2	
5		5
6		18

- i) Insert the correct four missing numbers. 1

- ii) Calculate the mean score. 1

- e) The frequency histogram below shows the survey of cars passing STHS. The number of occupants in each car is shown.



- i) What is the modal number of occupants? 1

- ii) What is the total number of occupants in this survey? 1

- iii) What is the total number of cars in this survey? 1

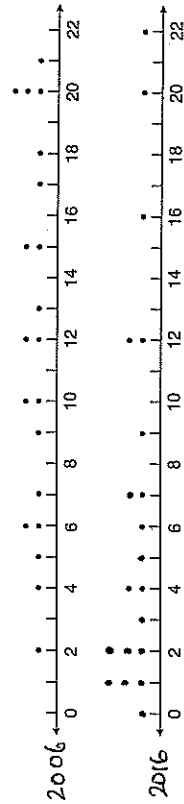
- iv) A fifth column is to be drawn to represent 9 cars having 5 occupants in each.

- α) Draw this extra column accurately onto the histogram above. Use a ruler. 1

- β) Find the median number of occupants per car. 1

- f) Twenty adult smokers were chosen at random in 2006. The number of cigarettes each smoked in a day was recorded. Ten years later, in 2016, the process was repeated with the same people.

The data is shown on the dot plots below.



i) Comment briefly on how the smoking pattern changed for these people over the 10 years. 1

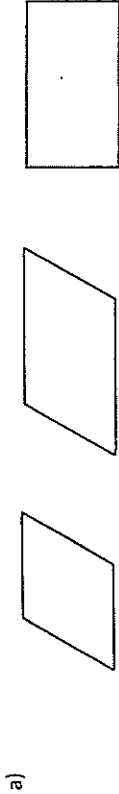
ii) Find the difference in medians for the 1
cigarettes smoked in 2006 and 2016.

g) The back-to-back stem-and-leaf plot below shows the test scores of a Year 8 maths class.
The left side shows the scores with no pre-test study, the right side shows scores with plenty

no study	stem	plenty of study
6 4 1 0 0	3	
7 6 4 1	4	
9 8 5 2 0	5	1 4
3 2 1	6	2
8 0	7	0 0 2 5
2	8	0 0 3 6 7 7
	9	0 0 1 4 5 9 9

i) How many students are in the class? 2
ii) What is the mean test score for the class after they studied for the test?

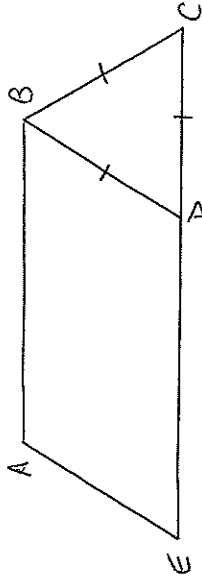
QUESTION 5 (14 marks) MEASUREMENT / GEOMETRY



For the quadrilaterals above, complete the table below : \checkmark for YES, \times for NO. 3

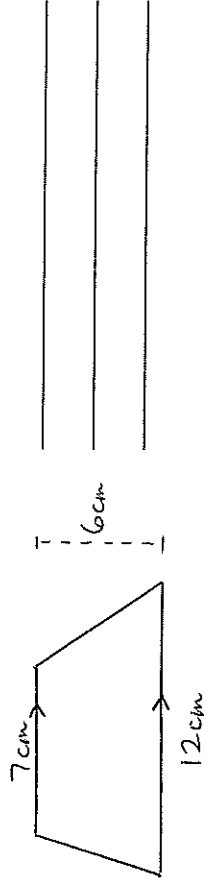
PROPERTY	RHOMBUS	PARALLELOGRAM	RECTANGLE
Opposite angles are equal.			
Diagonals are equal.			
Diagonals bisect each other.			
Diagonals meet at 90° .			
Diagonals bisect corner angles.			

b) Parallelogram ABDE is shown joined to equilateral $\triangle BDC$.

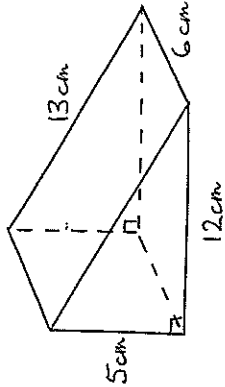


Find the size of $\angle ABD$, giving reasons

c) Find the area of this shape : 1



d)



For this prism, find the :

2

- i) volume _____
- ii) surface area _____

e) Complete : i) $36 \text{ cm} =$ _____ metres

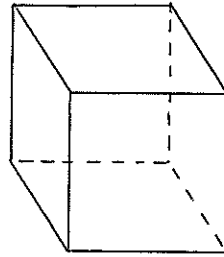
ii) $2 \text{ cm}^2 =$ _____ mm^2

2

f) A large cube has a total external surface area of 24 m^2 .

Find the : i) side length of the cube.

1

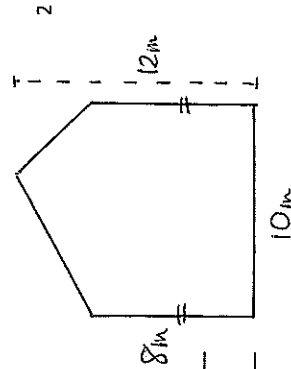


ii) capacity of the cube in litres.

1

g) Farmer Fady wants to paint the side of this barn. One tin of paint covers 9 m^2 of wall area.

How many tins of paint will he need to purchase?

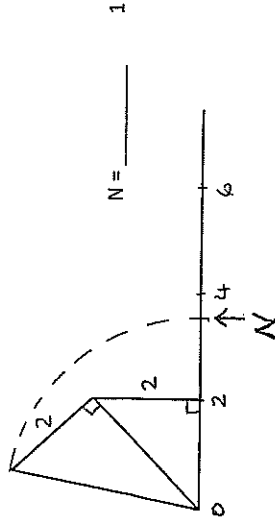


2

QUESTION 6 (10 marks) MIXED / HARDER

NUMBER a) i) Find the value of N on this

number line, in exact form:



N = _____

1

ii) A jacket originally cost \$120. A discount of

20% is given for paying in cash, and then

another 20% is taken off the reduced price.

What is the total percentage discount from the

original price?

ALGEBRA b) i) If $g(m) = 2m + 5m^2$, find $g(3k)$

1

ii) Expand and simplify $(2x + 3)(x - 4) - 5(x - 3)$

1

EQUATIONS

c) i) Solve $\frac{x+3}{4} = 5 + \frac{2x-1}{6}$

ii) If $S = ut + \frac{1}{2}at^2$, find "a" if $S = 200$,

$u = -5$, $t = 5$.

STATISTICS

d) i) The mean of 10 scores is 7.5 .

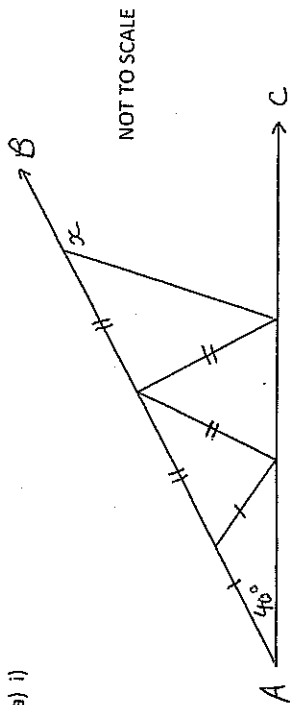
A new score is added and the mean is now 7.2 . What is the new score?

ii) Write any 5 scores that have a range of 30,

a mode of 56 and a median of 60. (Write the scores from smallest to largest).

GEOMETRY / MEASUREMENT

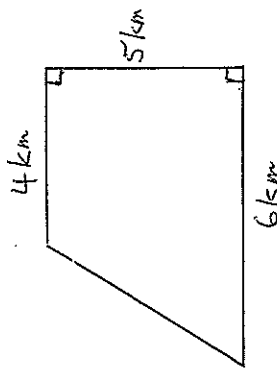
a) i)



AB and AC are straight. Four isosceles triangles are shown, with $\angle A = 40^\circ$.

Find the size of x in degrees. (reasons are not required) Answer : $x =$ _____

ii) Farmer Fady (again) has a large paddock of land with dimensions as shown :



How many hectares does his land enclose?

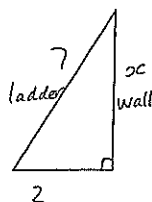
END OF TEST

- i) A ladder, 7 m long and on level ground, leans against a vertical wall.

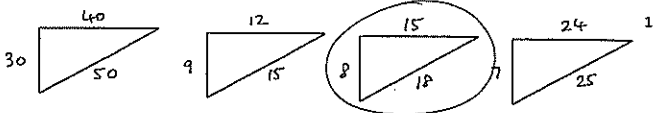
The base of the ladder is placed 2m out from the base of the wall.

How far does the ladder reach up the wall, correct to 1 dec. place?

$$\begin{aligned} 7^2 &= x^2 + 2^2 \\ x^2 &= 45 \\ x &= \sqrt{45} \\ &= 6.7 \text{ m (1 dec.)} \end{aligned}$$



- j) The triangles below are not drawn to scale. Circle all the triangles which cannot be right-angled.



- k) If 15% of an item is \$21, find the item's full price.

$$\begin{aligned} &\$140 \end{aligned}$$

QUESTION 2 (14 marks) ALGEBRA / NUMBER PLANE

- a) Fully simplify:

(1 each)

i) $4a^2 + 3a - a^2 + 5a$

ii) $6 \times m \times 4a \div 2m$

iii) $(4ab)^2 \times 2a^3b$

$$3a^2 + 8a$$

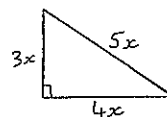
$$12a$$

$$32a^5b^3$$

- b) For this shape, find a simple expression for the:

i) perimeter P $P = 12x$ (or just $12x$)

ii) area A $A = 6x^2$ (or just $6x^2$)



c) Fully factorise $6x^2 - 9xy$ $3x(2x - 3y)$

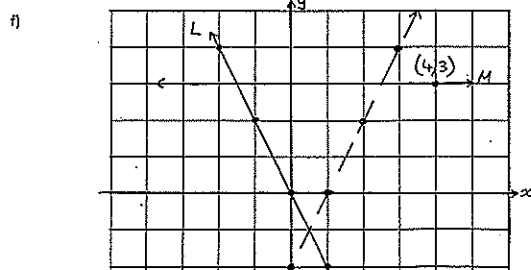
d) If $f(x) = 4x + 2x^2$, find $f(3)$ 30

e) Simplify: i) $\frac{2a}{3} + \frac{a}{4}$ (1 each)

$$\frac{8a}{12} + \frac{3a}{12} = \frac{11a}{12}$$

ii) $\frac{2ab}{3} \div \frac{b}{6}$

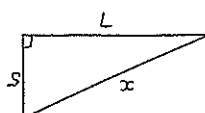
$$\frac{2ab}{3} \times \frac{6}{b} = 4a$$



- f) Complete this table of values for line L:

x	-2	-1	0	1
y	4	2	0	-2

$$\begin{aligned} x^2 &= 25 + 49 \\ x &= \sqrt{74} \end{aligned}$$



- h) Find the value of x in exact form.

- i) How far can car A travel on 60 litres?
7.5 litres

- ii) How much more fuel does car B use compared to car A?
500 km.

- iii) Car A has an average fuel consumption of 7.5 L/100 km, whilst car B has an average fuel consumption of 9 L/100 km. They both travel 500 km.

- iv) Convert the rate 8 m/s to: i) m/minute
480

- ii) km/h
28.8

- v) In a class there are 18 boys and 12 girls. If 4 more girls arrive, how many extra boys are needed to keep to the original ratio?
6

- vi) Find the value of x if $\frac{4}{3} = \frac{x}{5}$
 $6\frac{2}{3}$ (or $\frac{20}{3}$)

- vii) Reduce \$700 by 28%
\$504

- viii) Express $1\frac{1}{2}$ as a percentage
160%

- ix) Express $8\frac{1}{2}\%$ as a decimal
0.085

- x) Simplify the ratio 1 km : 300 m
10 : 3

ANSWERS

QUESTION 1 (14 marks) NUMBER.

EXAM TOTAL /80

Number	Question 1	/14	Q6 a)	/2	/16
Algebra/Number Plane	Question 2	/14	Q6 b)	/2	/16
Equations	Question 3	/14	Q6 c)	/2	/16
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Measurement/Geometry	Question 5	/14	Q6 e)	/2	/16
TOTALS					

* Full marks cannot be given for illegible writing.

* Use a pen only and a ruler for straight lines.

Instructions: * Time allowed: 70 minutes * Show necessary working.

Name _____ Teacher _____

OCTOBER 2016

YEAR 8 ASSESSMENT 3

Mathematics

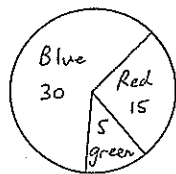


Sydney Technical High School

ANSWERS / MARKING

f) If $v = u + at$, find v when $u = 2$, $a = 3$, $t = 4$. $v = 14$ 1

b) A group of 50 people was surveyed about their favourite colour. The results are shown in the sector graph below. The sectors are not drawn with the correct angles. 1



What should the correct angle be for "Blue"? 1
 $\frac{30}{50} \times 360^\circ = 216^\circ$

g) $C = \frac{5}{9}(F - 32)$ is the formula connecting temperature in degrees Fahrenheit with degrees 2

Celsius. Use this formula to :

i) find C when $F = 167$

ii) find F when $C = 40$

$C = \frac{5}{9}(167 - 32)$
 $= 75$

$40 = \frac{5}{9}(F - 32)$
 $72 = F - 32$
 $F = 104$

h) "Young's Rule" is used to calculate a child's medicine dose. 1

It is $C = \frac{nA}{n+12}$, where : C is the child's dose in mL

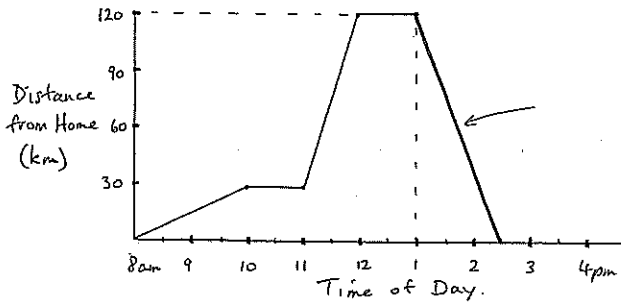
n is the child's age in years

A is the adult's dose in mL

The adult dose is 30 mL. Find the dose for a child aged 12 years old.

$C = \frac{12 \times 30}{12 + 12}$
 $= \frac{360}{24}$
 $= 15 \text{ mL}$

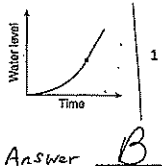
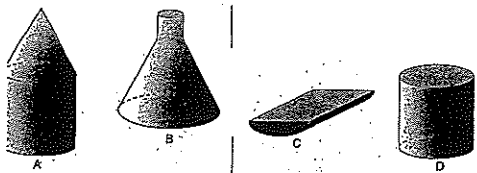
c) This travel graph shows Irene's journey. 1



Draw a straight line with a ruler that shows Irene returns home at an average speed of 80 km/h.

QUESTION 4 (14 marks) GRAPHS / STATISTICS

a) Each container shown below was filled with water at a steady rate. When the level of water in one of the containers was plotted, the graph was obtained. Which container does the graph show? 1



Answer B

d) A table for a set of scores is shown. 1

Score x	Frequency f	fx
3	4	12
4	2	8
5	1	5
6	3	18

i) Insert the correct four missing numbers. 1

ii) Calculate the mean score. 1

$\bar{x} = \frac{43}{10}$

$= 4.3$

Answer 3 1

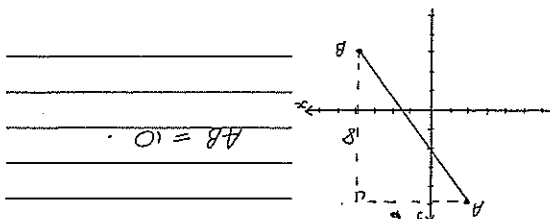
$x \geq -1\frac{2}{3}$
 $x \geq \frac{7}{10}$
 $-7x \geq 10$
 $-4x \geq 10 + 3x$

Which line 1, 2, 3 or 4 first contains an error?

b) To solve the inequality $2 - 4x \geq 12 + 3x$, an incorrect solution is shown below.

$m = 4$
 $m - 6 = -2$
 $2x - 3 = 0$
 $2x = 3$
 $x = \frac{3}{2}$
 $8a - 8 = 12a + 8$
 $-4a = 16$
 $a = -4$

QUESTION 3 (14 marks) EQUATIONS / INEQUALITIES / FORMULAE



g) Plot the points A(-2, 5) and B(4, -3) below and find the length AB. 1

iv) On the number plane above, graph the line $y = 2x - 2$. Use a ruler. (check no. plane over)

$y = -2x$
 $y = 3$

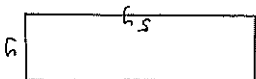
iii) Write the equation for line M

1

1

1

d) Let the width of the rectangle below be y cm. The rectangle is five times longer than it is wide. 1



i) Write a simple expression for the rectangle's length in terms of y . 1

ii) The perimeter of the rectangle is 66 cm. Write and solve an equation and then 2

Find the area of the rectangle.

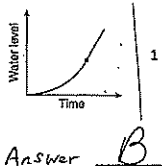
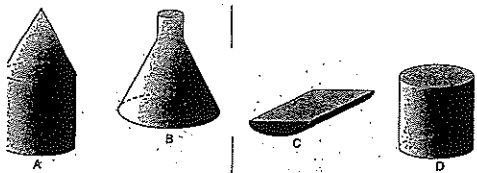
$2y = 66$
 $y = 33$
 $5y = 165$
 $Area = 5y \times 27\frac{1}{2}$
 $= 151.25 \text{ cm}^2$

e) The sum of a certain number and six is the same as three less than twice the number. Write and solve an equation to find the number. 2

$n + 6 = 2n - 3$
 $n = -9$
 $\therefore n = -9$

QUESTION 4 (14 marks) GRAPHS / STATISTICS

a) Each container shown below was filled with water at a steady rate. When the level of water in one of the containers was plotted, the graph was obtained. Which container does the graph show? 1



Answer B

d) A table for a set of scores is shown. 1

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5	1	5
6	3	18

i) Insert the correct four missing numbers. 1

ii) Calculate the mean score. 1

$\bar{x} = \frac{43}{10}$

$= 4.3$

Answer 3 1

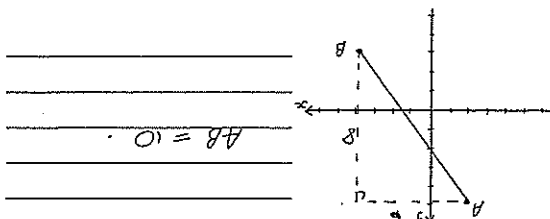
$x \geq -1\frac{2}{3}$
 $x \geq \frac{7}{10}$
 $-7x \geq 10$
 $-4x \geq 10 + 3x$

Which line 1, 2, 3 or 4 first contains an error?

b) To solve the inequality $2 - 4x \geq 12 + 3x$, an incorrect solution is shown below.

$m = 4$
 $m - 6 = -2$
 $2x - 3 = 0$
 $2x = 3$
 $x = \frac{3}{2}$
 $8a - 8 = 12a + 8$
 $-4a = 16$
 $a = -4$

QUESTION 3 (14 marks) EQUATIONS / INEQUALITIES / FORMULAE



g) Plot the points A(-2, 5) and B(4, -3) below and find the length AB. 1

iv) On the number plane above, graph the line $y = 2x - 2$. Use a ruler. (check no. plane over)

$y = -2x$
 $y = 3$

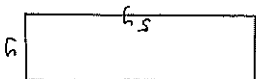
iii) Write the equation for line M

1

1

1

d) Let the width of the rectangle below be y cm. The rectangle is five times longer than it is wide. 1



i) Write a simple expression for the rectangle's length in terms of y . 1

ii) The perimeter of the rectangle is 66 cm. Write and solve an equation and then 2

Find the area of the rectangle.

$2y = 66$
 $y = 33$
 $5y = 165$
 $Area = 5y \times 27\frac{1}{2}$
 $= 151.25 \text{ cm}^2$

e) The sum of a certain number and six is the same as three less than twice the number. Write and solve an equation to find the number. 2

$n + 6 = 2n - 3$
 $n = -9$
 $\therefore n = -9$

QUESTION 5 (14 marks) MEASUREMENT / GEOMETRY



For the quadrilaterals above, complete the table below: ✓ for YES, ✗ for NO.

PROPERTY	RHOMBUS	PARALLELOGRAM	RECTANGLE
Opposite angles are equal.	✓	✓	✓
Diagonals are equal.	✗	✗	✓
Diagonals bisect each other.	✓	✓	✓
Diagonals meet at 90°.	✓	✗	✗
Diagonals bisect corner angles.	✓	✗	✗

(1 mark) (1 mark) (1 mark)

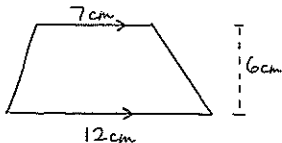
b) Parallelogram ABDE is shown joined to equilateral ΔBDC.



Find the size of ∠ABD, giving reasons

$\angle BDC = 60^\circ$ (equal angles in equilateral triangle)
 $\therefore \angle ABD = 60^\circ$ (alternate angles, parallel lines)

c) Find the area of this shape:



$$A = \frac{1}{2} \times 6(7+12)$$

$$= 3 \times 19$$

$$= 57 \text{ cm}^2$$

$$5 \times 0.75 = 3.75$$

$$\frac{20}{16.5} = 1.21$$

after they studied for the test?

20

ii) What is the mean test score for the class?

9	0	0	1	4	5	9
8	0	0	3	6	7	7
8	0	7	0	0	2	5
3	2	1	6	2		
9	8	5	2	0	5	1
7	6	4	1	4		
6	4	1	0	0	3	

The left side shows the scores with no pre-test study, the right side shows scores with plenty

g) The back-to-back stem-and-leaf plot below shows the test scores of a Year 8 maths class.

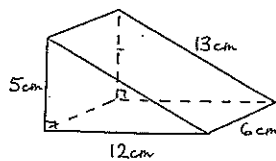
ii) Find the difference in medians for the cigarettes smoked in 2005 and 2016.

$$12 - 4.5 = 7.5$$

i) Comment briefly on how the smoking pattern changed for these people over the 10 years.

The number of cigarettes smoked decreased.

d)



For this prism, find the:

i) volume $V = 30 \times 6$
 $= 180 \text{ cm}^3$

ii) surface area
 $SA = 30 + 30 + 78 + 72 + 30$
 $= 240 \text{ cm}^2$

e) Complete: i) 36 cm = 0.36 metres

ii) 2 cm² = 200 mm²

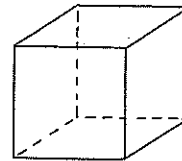
f) A large cube has a total external surface area of 24 m².

Find the: i) side length of the cube.

2 m

ii) capacity of the cube in litres.

8 m³ = 8000 litres.



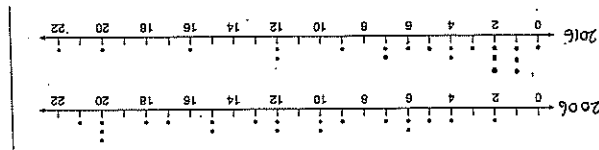
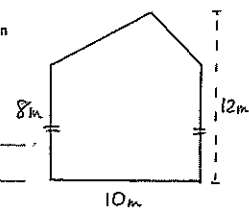
g) Farmer Fady wants to paint the side of this barn. One tin

of paint covers 9 m² of wall area.

How many tins of paint will he need to purchase?

$$A = 80 + 20 = 100 \text{ m}^2$$

$\therefore 12 \text{ tins needed.}$



The data is shown on the dot plots below.

i) Twenty adult smokers were chosen at random in 2006. The number of cigarettes each smoked in a day was recorded. Ten years later, in 2016, the process was repeated with the same people.

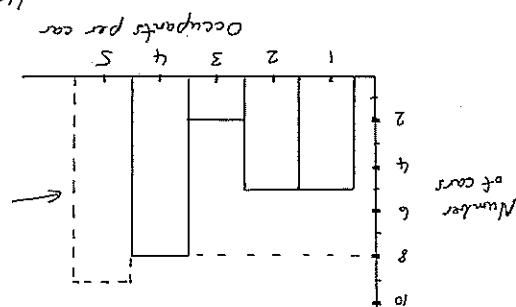
β) Find the median number of occupants per car.

iv) A fifth column is to be drawn to represent 9 cars having 5 occupants in each.

iii) What is the total number of cars in this survey?

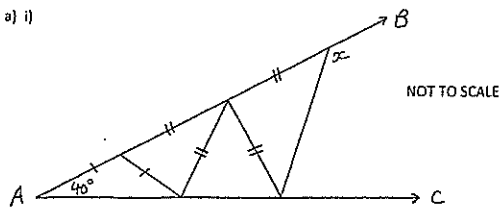
ii) What is the total number of occupants in this survey?

i) What is the modal number of occupants?



e) The frequency histogram below shows the survey of cars passing 5THS. The number of occupants in each car is shown.

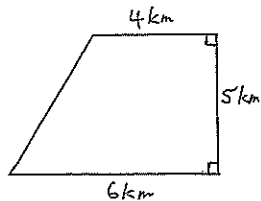
a) i)



AB and AC are straight. Four isosceles triangles are shown, with $\angle A = 40^\circ$.

Find the size of x in degrees. (reasons are not required) Answer: $x = 140^\circ$ 1

ii) Farmer Fady (again) has a large paddock of land with dimensions as shown :



How many hectares does his land enclose? 1

$$\begin{aligned} \text{Area} &= 20 + 5 = 25 \text{ km}^2 \\ \therefore \text{hectares} &= 25 \times 100 \\ &= 2500. \end{aligned}$$

END OF PLSI

$$\begin{aligned} &= 2x^2 - 10x + 3 \\ &= 2x^2 - 8x + 3x - 12 - 5x + 15 \\ &= 2x^2 - 10x + 3 \end{aligned}$$

ii) Expand and simplify $(2x+3)(x-4) - 5(x-3)$ 1

$$\begin{aligned} &= 6k + 45k^2 \\ &= 6k + 45k^2 \end{aligned}$$

ALGEBRA b) i) if $g(m) = 2m + 5m^2$, find $g(3k)$ 1

$$= 36\%$$

original price?

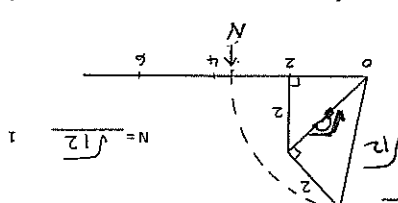
What is the total percentage discount from the original price?

another 20% is taken off the reduced price.

20% is given for paying in cash, and then

paid 0.8 x 0.8 x 120 = \$76.80

ii) A jacket originally cost \$120. A discount of 1



number line, in exact form:

NUMBERS. a) i) Find the value of N on this

QUESTION 6 (10 marks) MIXED / HARDER

EQUATIONS

$$\frac{x+3}{4} = 5 + \frac{2x-1}{6}$$

(each)

$$\text{ii) If } S = ut + \frac{1}{2}at^2, \text{ find "a" if } S = 200, u = -5, t = 5.$$

STATISTICS

d) i) The mean of 10 scores is 7.5. (each)

A new score is added and the mean

is now 7.2. What is the new score?

$$\text{new score} = (11 \times 7.2) - (10 \times 7.5)$$

$$= 79.2 - 75$$

$$= 4.2$$

$$\text{(suggested)} \\ 56, 56, 60, 60, 64, 86$$

scores from smallest to largest.

a mode of 56 and a median of 60. (Write the

ii) Write any 5 scores that have a range of 30,

2

$$\begin{aligned} 200 &= -25 + \frac{1}{2}a \times 25 \\ \frac{225}{2} &= \frac{25a}{2} \\ 450 &= 25a \\ a &= 18. \end{aligned}$$

2