SYDNEY TECHNICAL HIGH SCHOOL

(Established 1911)

YEAR 8
YEARLY EXAMINATION
2014

Mathematics

General Instuctions

- Working time - 70 minutes
- Write using black or blue pen
- Calculators may be used
- All necessary working should be shown in every question
- Diagrams are not drawn to scale

Total marks - 80

- Attempt Questions 1 – 5
- All questions are of equal value

Name :_____

Teacher :_____

Question 1	Question 2	Question 3	Question 4	Question 5	**Total**

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Section 1 : Number, Rates and Ratio and Percentages (16 marks – 1 each)

1. Express 14 out of 80 as a percentage.	6. Express $7\frac{1}{2}$ % as a decimal.
2. A sequence is formed by adding the two previous numbers together. Fill in the missing two numbers in this sequence. **4 , ____ , ____ , 22**	7. Find the simple interest earned on $9600 invested at 4%pa for 3 years.
3. Simplify 10 : 25	8. Simplify 40 seconds : 4 minutes.
4. Find 12% of 800.	9. Increase $360 by 5%.
5. A map has a scale of 1 : 1500. How many metres does a distance of 15 mm on the map represent ?	10. Simplify $2\frac{1}{2} : 1\frac{1}{3}$

11. Kevin and Stuart divide a sum of money between themselves in the ratio 3 : 5. If Stuart receives $110, how much does Kevin receive?

12. A coal loader can move coal at the rate of 850 tonnes per hour. How much coal does it move in a week?

13. A plane is loaded with 480 tonnes of fuel. This is 20% more than required for a flight under normal conditions. If the conditions are normal, how much fuel will be used for this flight?

14. Susan and Wendy divide $270 between themselves in the ratio 5 : 4. How much does Susan receive?

15. Express 720 kilometres per hour as a speed in metres per second.

16. A mixture contains olive oil and vinegar in the ratio 2 : 3. In what ratio should this mixture be mixed with pure olive oil to produce a new mixture containing equal amounts of olive oil and vinegar ?

Section 2 : Algebra and Number Plane (16 marks - 1 mark each unless otherwise indicated)

1. Simplify $3x - 7 + 2x + 3$	2. Expand and simplify $(3x - 2)(x + 4)$
3. Evaluate $10 - 2x^2$ when $x = -1$	4. Simplify $\frac{m^2}{2} \div \frac{m}{4}$
5. factorise $8x^2 - 4x$	6. Simplify $\frac{7a}{4} - \frac{a}{2}$
7. Expand and simplify $(x + 5)^2$	8. Expand and simplify (2 marks) $3(2x - 1) - (x - 3)(x + 3)$

9. The coordinates of the points A and B are $(3, 5)$ and $(7, 5)$ respectively.

a) Find the distance AB. _____

_____

b) Find the equation of the line passing through A and B.

_____

_____

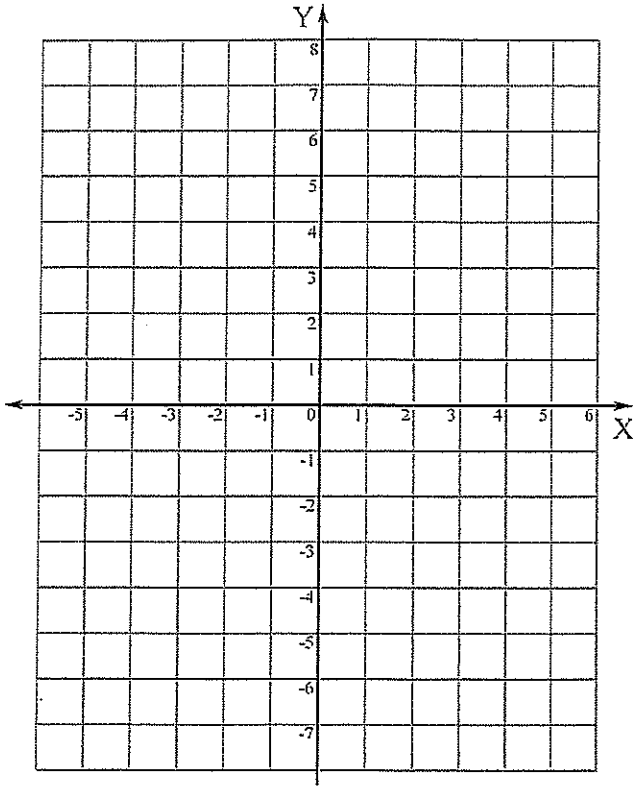
c) If triangle ABC is isosceles, give the possible coordinates of C.

_____

_____

10. a) On the number plane below, graph the lines i) $y = 6 - 2x$

ii) $x = 1$



b) Find the area bounded by the lines $y = 6 - 2x$, $x = 1$ and the x axis. (2 marks)

_____

_____

_____

Section 3 : Graphs, Statistics, Geometry and Measurement (16 marks)

1. The results of a class test are shown on the following stem and leaf plot.

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

For the above scores calculate

a) The range. _____ (1 m)

b) The mean. _____ (2 m)

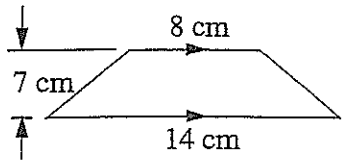
_____

2. Complete the frequency distribution table for the following scores. (2 m)

14 , 6 , 4 , 3 , 11 , 4 , 5 , 12 , 3 , 2 , 15 , 10 , 9 , 6 , 10

Class	Tally	Frequency
1 - 3		
4 - 6		
7 - 9		
10 - 12		
13 - 15		

3. Find the area of the following trapezium. (1 m)

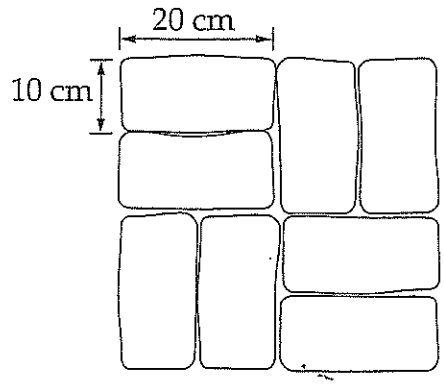


_____

_____

_____

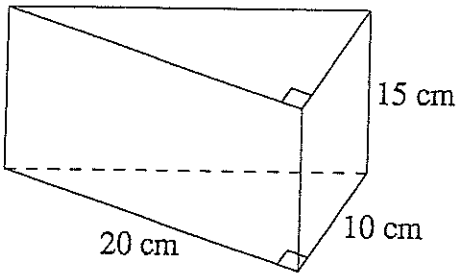
4. Alice is going to use this pattern to pave her courtyard. (1 m)



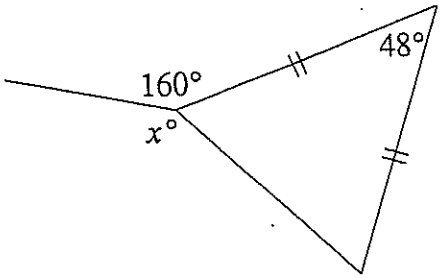
She is going to pave an area of 12 m^2.

How many 20 cm by 10 cm pavers will she need?

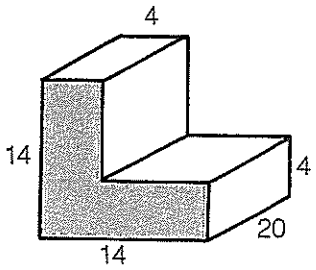
5. Calculate the volume of the following triangular prism. (1 m)



6. Find the value of x. (no reasons needed) (1 m)

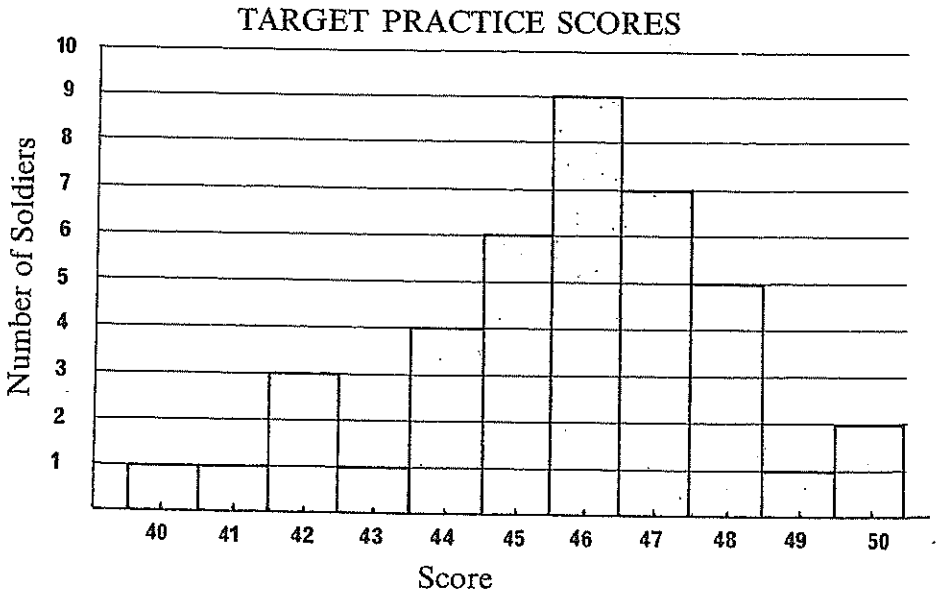


7. Calculate the volume of the following shape which consists of 2 rectangular prisms. (1 m)



Measurements are in centimetres.

8. The following histogram shows the scores of a squad of soldiers at target practice.

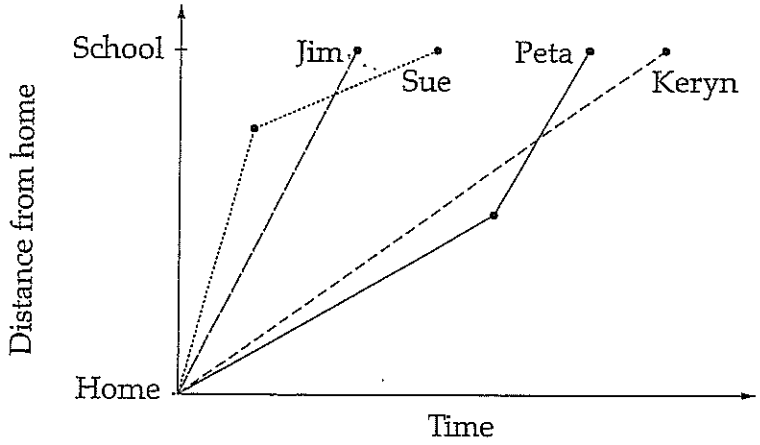


Use this histogram to find

a) The number of soldiers in the squad. _____ (1 m)

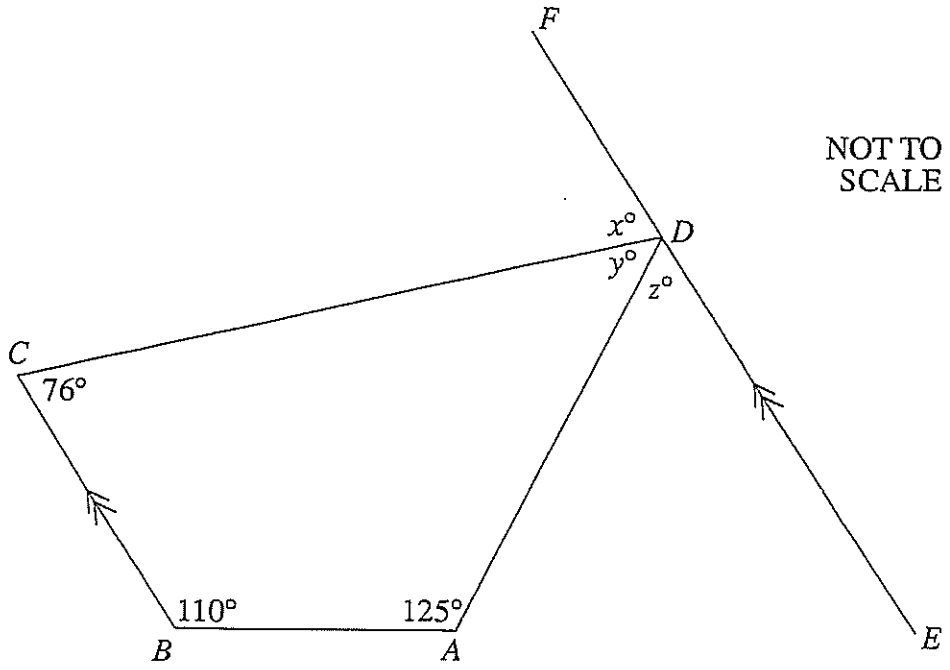
b) The median of these scores. _____ (1 m)

9. Sue, Jim, Keryn and Peta cycle to school. This graph represents their journeys.



Who has the highest average speed ? _____ (1 m)

10.



Find the value of each pronumeral, giving reasons.

a) x= _____ (1 m)

b) y= _____ (1 m)

c) z= _____ (1 m)

Section 4 : Equations (16 marks)

1. Solve $5x - 8 = 3x + 11$ (2 marks)

2. Solve $\frac{2}{15} = \frac{1}{8} + \frac{1}{x}$ (2 marks)

3. Solve $8 - 2x < 20$ (2 marks)

4. Given $v = u + at$ (2 marks)
   Find a when $v = 2.4$, $u = 0.6$ and $t = 0.3$

5. Solve $4(2y + 1) = 3(y + 8)$ (2 marks)

6. Solve (2 marks)
   $3(m - 2) - 2(m + 1) = 5$

7. If $3a - 4b = 6$ and $b = 3$ (1 mark)
find the value of a .

8. Hua is x years old. Tanya is 6 years older than Hua. Rosa is 3 years older than Tanya . The total of the ages of Hua, Tanya and Rosa is 45 years. Which equation represents this information? *(Circle the correct letter)* (1 mark)

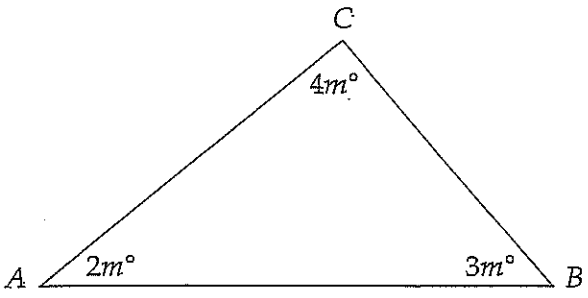
(A) x+9=45

(B) x+15=45

(C) 3x+9=45

(D) 3x+15=45

9.



a) Write down an equation that could be used to find the value of m. (1 mark)

_____

_____

b) By solving this equation find the value of m. (1 mark)

_____

_____

_____

_____

Section 5 : Miscellaneous Questions (16 marks)

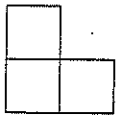
1. The design on a piece of fabric has stars and circles in the ratio 4 : 3. (1 mark)

   Explain the meaning of the underlined words.

   _____

   _____

2. Fifty **L** shaped tiles, each made out of three 1 cm by 1 cm squares,

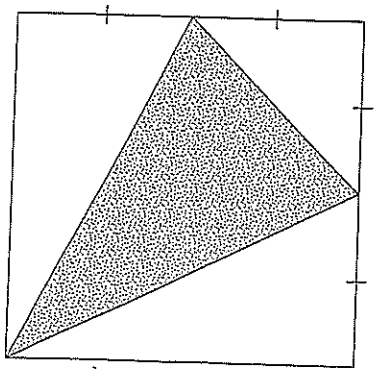


   are arranged as shown below.

   Find the perimeter of the resulting shape. (2 marks)

   _____

   _____

3. 

   What fraction of the square is shaded ? (1 mark)

   _____

   _____

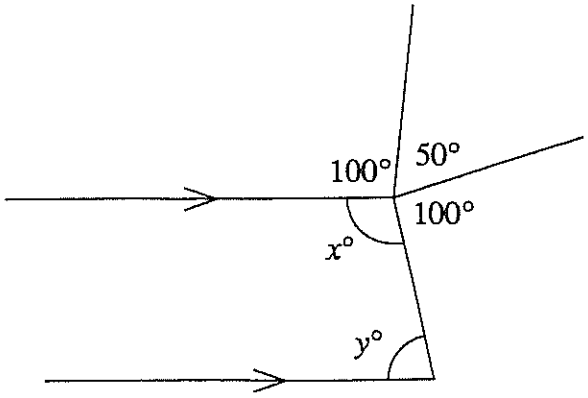
   _____

4. Simplify $\frac{1}{3x} + \frac{3}{x}$. (1 mark)

5. The scores 14, 17, 20, 22, 23, 23, 24, 33 have a mean of 22. (1 mark)

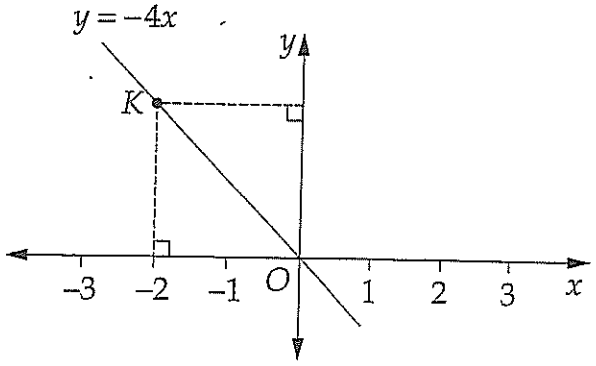
What new score must be added to these to increase the mean to 25 ?

6. (2 marks)



Find the value of x and y, giving reasons.

7. (1 mark)

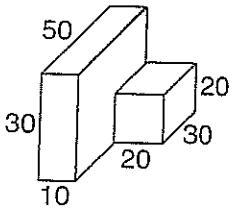


K is a point on the line $y = -4x$ as shown.

Find the coordinates of K.

8. Solve $\frac{x}{4} + 5x = 42$ (2 marks)

9. The following solid consists of two rectangular prisms joined as shown below. (2 marks)



Measurements are in centimetres.

Find the surface area of the resulting solid.

10. Frank paddles his canoe at 6 km/hr.

Today he is paddling on a river flowing at 4 km/hr.

a) What is his speed when he is paddling downstream ? (1 mark)

b) What is his speed when he is paddling upstream ? (1 mark)

c) If he paddles 30 km upstream and then 30 km downstream, what is his average speed for the trip ? (1 mark)

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Mathematics

General Instuctions

- Working time - 70 minutes
- Write using black or blue pen
- Calculators may be used
- All necessary working should be shown in every question
- Diagrams are not drawn to scale

Total marks - 80

- Attempt Questions 1 – 5
- All questions are of equal value

Name : SOLUTIONS

Teacher : _____

Question 1	Question 2	Question 3	Question 4	Question 5	**Total**

Section 1 : Number, Rates and Ratio and Percentages (16 marks – 1 each)

1. Express 14 out of 80 as a percentage.

$17\frac{1}{2}\%$

2. A sequence is formed by adding the two previous numbers together. Fill in the missing two numbers in this sequence.

4 , 9 , 13 , 22

3. Simplify 10 : 25

2 : 5

4. Find 12% of 800.

96

5. A map has a scale of 1 : 1500.
How many metres does a distance of 15 mm on the map represents ?

22.5 m

6. Express $7\frac{1}{2}\%$ as a decimal.

0.075

7. Find the simple interest earned on $9600 invested at 4%pa for 3 years.

S.I. = $1152

8. Simplify 40 seconds : 4 minutes.

1 : 6

9. Increase $360 by 5%.

$ 378

10. Simplify $2\frac{1}{2} : 1\frac{1}{3}$

15 : 8

11. Kevin and Stuart divide a sum of money between themselves in the ratio 3 : 5. If Stuart receives $110, how much does Kevin receive?

$66

12. A coal loader can move coal at the rate of 850 tonnes per hour. How much coal does it move in a week?

142800 tonnes

13. A plane is loaded with 480 tonnes of fuel. This is 20% more than required for a flight under normal conditions. If the conditions are normal, how much fuel will be used for this flight?

400 tonnes

14. Susan and Wendy divide $270 between themselves in the ratio 5 : 4. How much does Susan receive?

$150

15. Express 720 kilometres per hour as a speed in metres per second.

200 m/s

16. A mixture contains olive oil and vinegar in the ratio 2 : 3. In what ratio should this mixture be mixed with pure olive oil to produce a new mixture containing equal amounts of olive oil and vinegar ?

5:1

Section 2 : Algebra and Number Plane (16 marks - 1 mark each unless otherwise indicated)

1. Simplify $3x - 7 + 2x + 3$ $5x - 4$	2. Expand and simplify $(3x - 2)(x + 4)$ $3x^2 + 10x - 8$
3. Evaluate $10 - 2x^2$ when $x = -1$ 8	4. Simplify $\frac{m^2}{2} \div \frac{m}{4}$ $2m$
5. factorise $8x^2 - 4x$ $4x(2x - 1)$	6. Simplify $\frac{7a}{4} - \frac{a}{2}$ $\frac{5a}{4}$
7. Expand and simplify $(x + 5)^2$ $x^2 + 10x + 25$	8. Expand and simplify (2 marks) $3(2x - 1) - (x - 3)(x + 3)$ $6x - 3 - x^2 + 9$ $-x^2 + 6x + 6$

9. The coordinates of the points A and B are $(3, 5)$ and $(7, 5)$ respectively.

a) Find the distance AB. 4 units

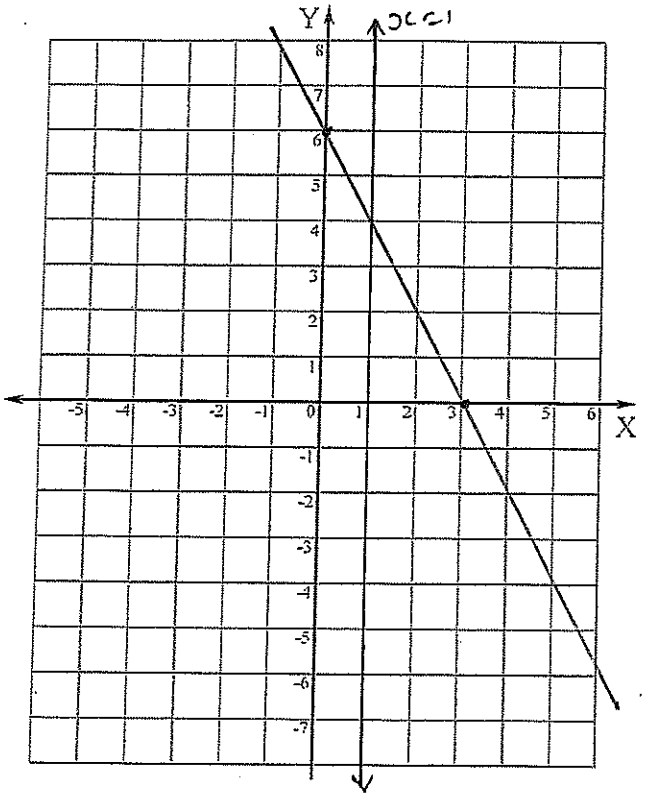
b) Find the equation of the line passing through A and B.

$y = 5$

c) If triangle ABC is isosceles, give the possible coordinates of C.

(5, 1)

10. a) On the number plane below, graph the lines i) $y = 6 - 2x$



ii) $x = 1$

b) Find the area bounded by the lines $y = 6 - 2x$, $x = 1$ and the x axis. (2 marks)

4 sq units

Section 3 : Graphs, Statistics, Geometry and Measurement (16 marks)

1. The results of a class test are shown on the following stem and leave plot.

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

For the above scores calculate

a) The range. 30 (1 m)

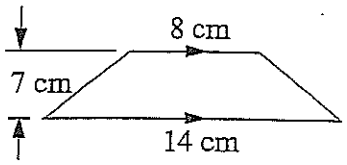
b) The mean. 30.4 (2 m)

2. Complete the frequency distribution table for the following scores. (2 m)

14 , 6 , 4 , 3 , 11 , 4 , 5 , 12 , 3 , 2 , 15 , 10 , 9 , 6 , 10

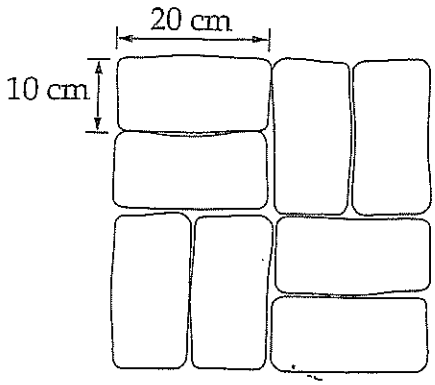
Class	Tally	Frequency
1 - 3	III	3
4 - 6	~~IIII~~	5
7 - 9	I	1
10 - 12	IIII	4
13 - 15	II	2

3. Find the area of the following trapezium. (1 m)



77 cm^2

4. Alice is going to use this pattern to pave her courtyard. (1 m)

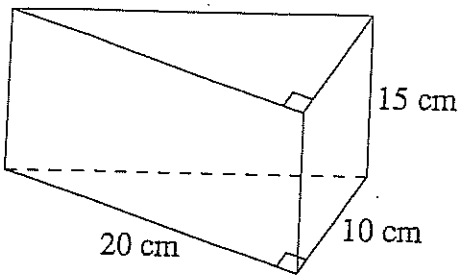


She is going to pave an area of 12 m^2.

How many 20 cm by 10 cm pavers will she need?

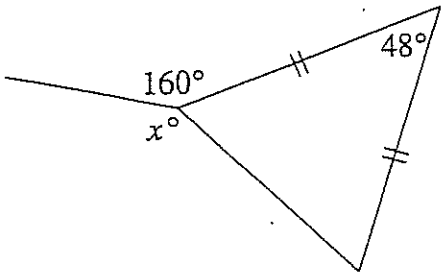
600

5. Calculate the volume of the following triangular prism. (1 m)



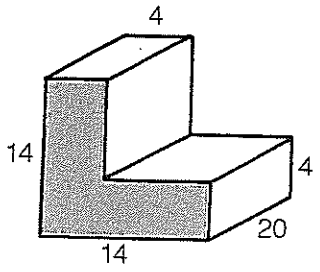
1500 cm^3

6. Find the value of x. (no reasons needed) (1 m)



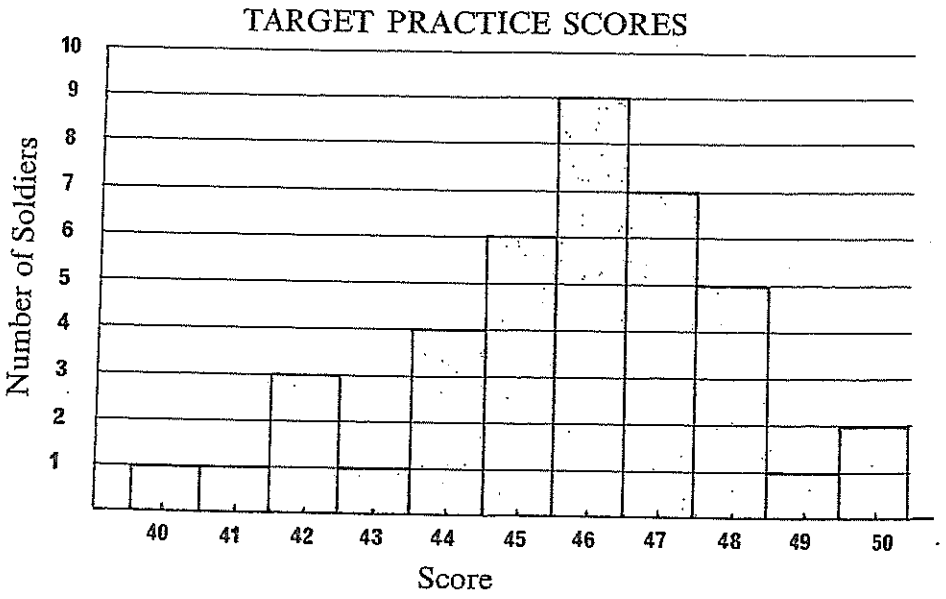
$x = 134$

7. Calculate the volume of the following shape which consists of 2 rectangular prisms. (1 m)



1920 u^3

8. The following histogram shows the scores of a squad of soldiers at target practice.

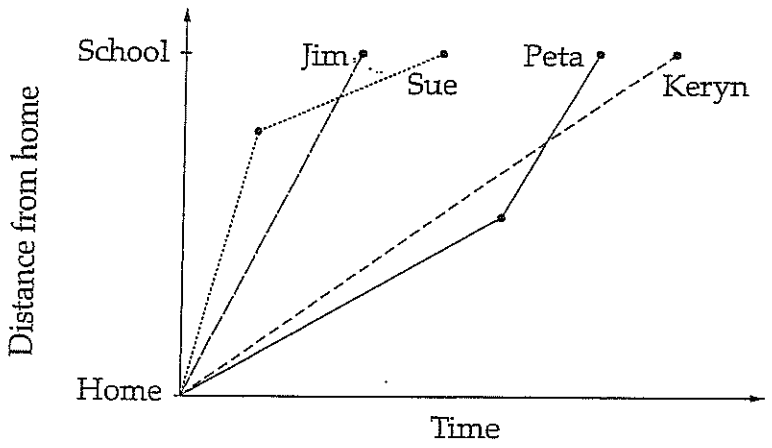


Use this histogram to find

a) The number of soldiers in the squad. 40 (1 m)

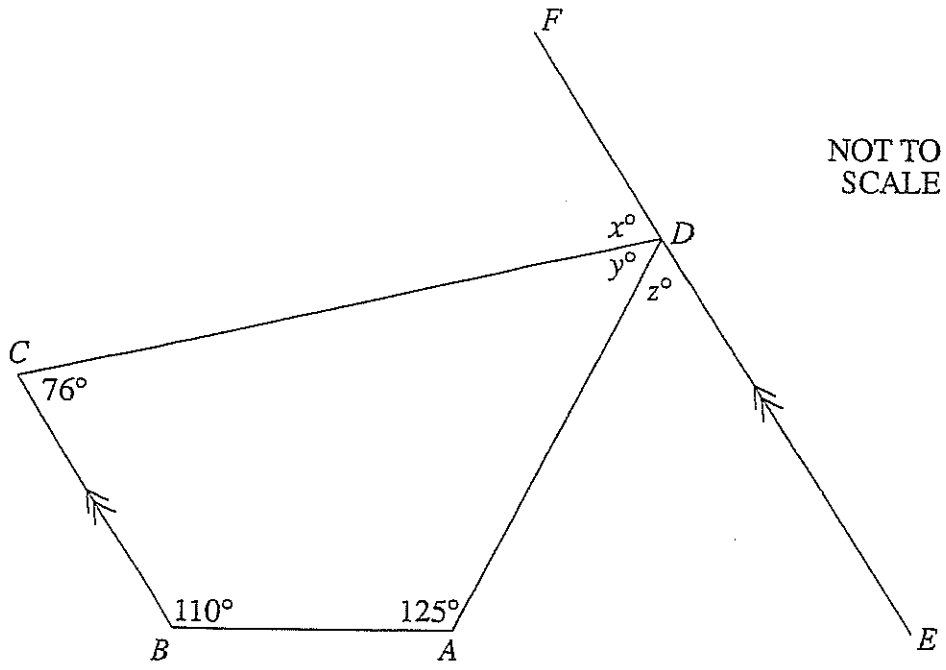
b) The median of these scores. 46 (1 m)

9. Sue, Jim, Keryn and Peta cycle to school. This graph represents their journeys.



Who has the highest average speed ? Jim (1 m)

10.



Find the value of each pronumeral, giving reasons.

a) x= 76 (alternate angles, parallel lines) (1 m)

b) y= 49 (angle sum of a quadrilateral) (1 m)

c) z= 55 (straight angle) (1 m)

Section 4 : Equations (16 marks)

1. Solve $5x - 8 = 3x + 11$ (2 marks)

$2x = 19$

$x = 9\frac{1}{2}$

2. Solve $\frac{2}{15} = \frac{1}{8} + \frac{1}{x}$ (2 marks)

$\frac{1}{120} = \frac{1}{x}$

$x = 120$

3. Solve $8 - 2x < 20$ (2 marks)

$-2x < 12$

$x > -6$

4. Given $v = u + at$ (2 marks)
Find a when $v = 2.4, u = 0.6$ and $t = 0.3$

$2.4 = 0.6 + 0.3t$

$1.8 = 0.3t$

$t = 6$

5. Solve $4(2y + 1) = 3(y + 8)$ (2 marks)

$8y + 4 = 3y + 24$

$5y = 20$

$y = 4$

6. Solve (2 marks)
$3(m - 2) - 2(m + 1) = 5$

$3m - 6 - 2m - 2 = 5$

$m = 13$

7. If $3a - 4b = 6$ and $b = 3$ (1 mark)
find the value of a.

$3a - 12 = 6$

$3a = 18$

$a = 6$

8. Hua is x years old. Tanya is 6 years older than Hua. Rosa is 3 years older than Tanya. The total of the ages of Hua, Tanya and Rosa is 45 years. Which equation represents this information?
(Circle the correct letter) (1 mark)

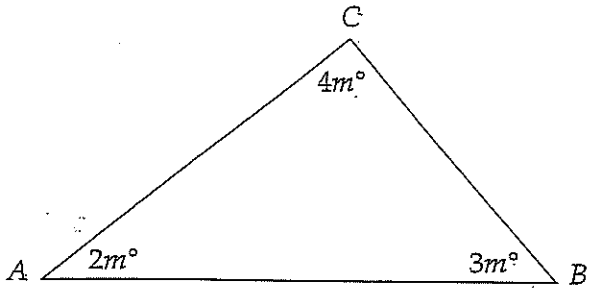
(A) x+9=45

(B) x+15=45

(C) 3x+9=45

(D) 3x+15=45

9.



a) Write down an equation that could be used to find the value of m. (1 mark)

$9m = 180$

b) By solving this equation find the value of m. (1 mark)

$m = 20$

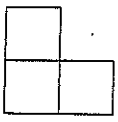
Section 5 : Miscellaneous Questions (16 marks)

1. The design on a piece of fabric has <u>stars and circles in the ratio 4 : 3</u>. (1 mark)

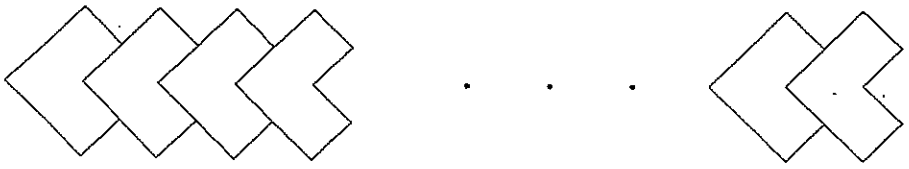
   Explain the meaning of the underlined words.

   For every 4 stars there are 3 circles

2. Fifty **L** shaped tiles, each made out of three 1 cm by 1 cm squares,

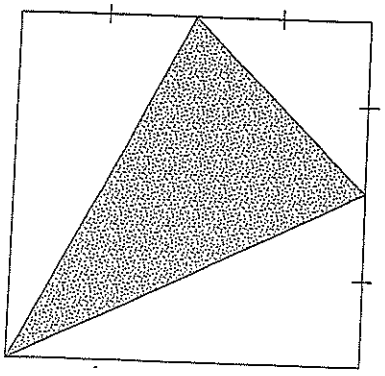


   are arranged as shown below.



   Find the perimeter of the resulting shape. (2 marks)

   204

3. 

   What fraction of the square is shaded ? (1 mark)

   $\frac{3}{8}$

4. Simplify $\frac{1}{3x}+\frac{3}{x}$. (1 mark)

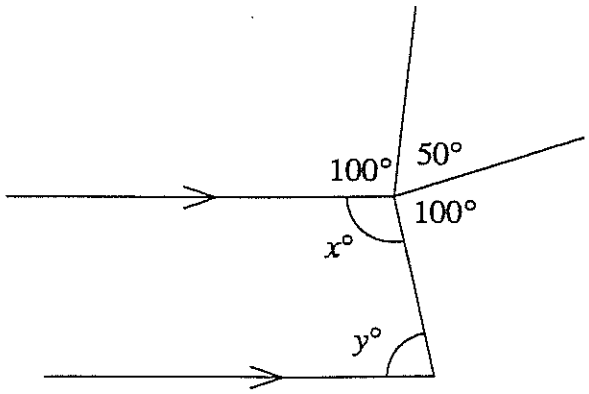
$\frac{10}{3x}$

5. The scores 14, 17, 20, 22, 23, 23, 24, 33 have a mean of 22. (1 mark)

What new score must be added to these to increase the mean to 25 ?

49

6. (2 marks)

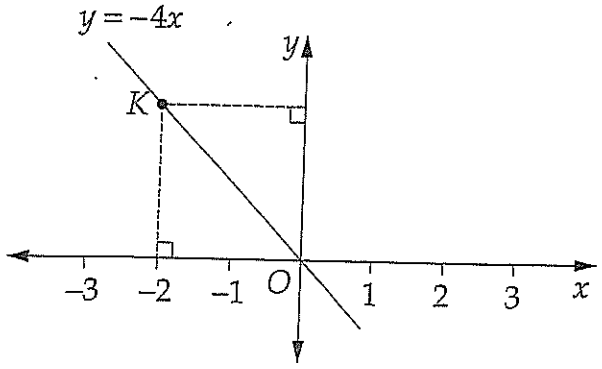


Find the value of x and y, giving reasons.

$x = 110$ (angle of revolution)

$y = 70$ (co-interior angles, parallel lines)

7. (1 mark)



K is a point on the line $y = -4x$ as shown.

Find the coordinates of K.

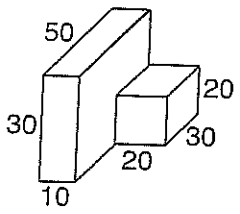
(-2, 8)

8. Solve $\frac{x}{4} + 5x = 42$ (2 marks)

$x + 20x = 168$

$x = 8$

9. The following solid consists of two rectangular prisms joined as shown below. (2 marks)



Find the surface area of the resulting solid.

6600 sq units

10. Frank paddles his canoe at 6 km/hr.

Today he is paddling on a river flowing at 4 km/hr.

a) What is his speed when he is paddling downstream ? (1 mark)

10 km/hr

b) What is his speed when he is paddling upstream ? (1 mark)

2 km/hr

c) If he paddles 30 km upstream and then 30 km downstream, (1 mark)

what is his average speed for the trip ?

$3\frac{1}{3}$ km/hr