SYDNEY TECHNICAL HIGH SCHOOL

(Established 1911)

YEAR 8

TERM 3 COMMON TEST

2016

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 - 75

- Attempt Questions 1 – 5

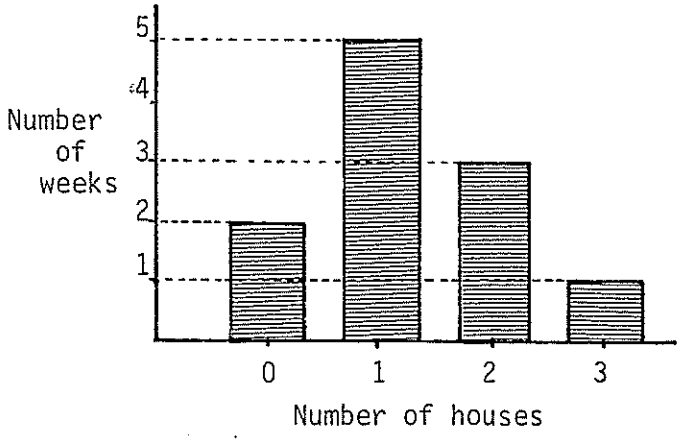
Name :_____

Teacher :_____

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

Section 1 : GRAPHS (14 marks)

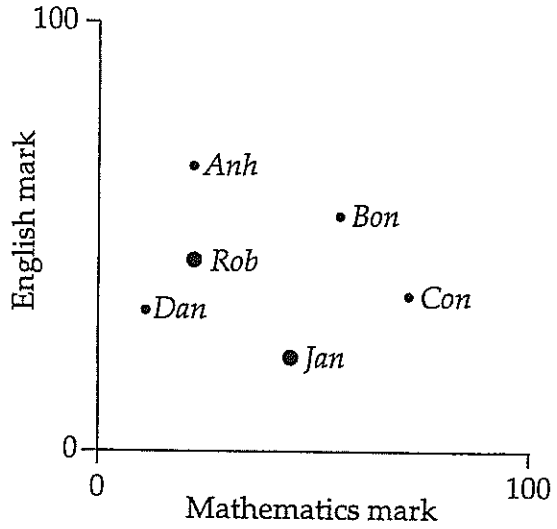
1.



The graph shows the number of weeks a salesperson sold 0, 1, 2 or 3 houses.

For how many weeks are sales shown ?

2.

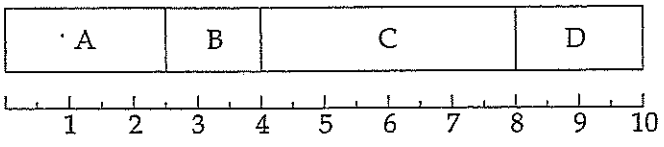


The graph shows the marks scored by a group of students in an English test and a Mathematics test.

Which student was better at Mathematics than Jan, but worse at English than Rob ?

---

3. Use the divided bar graph to complete the frequency table.



Grade	*Frequency*
A	30
B	18
C	
D	24

4.

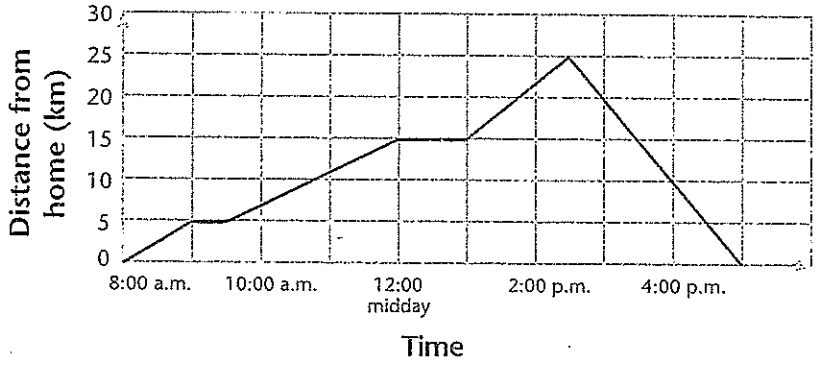
Bus	120
Walk	25
Train	40
Car	10
Other	5

A survey of 200 students was taken to determine the main method of transport they use to get to school. The results appear in the table.

These results are to be represented in a sector graph. What would be the correct angle size of the sector representing students who catch the train to school ?

---

5. The graph below shows Henry's journey on his bike.



i) Between what times did Henry have his first rest ?

---

ii) How far did Henry travel on this journey ?

---

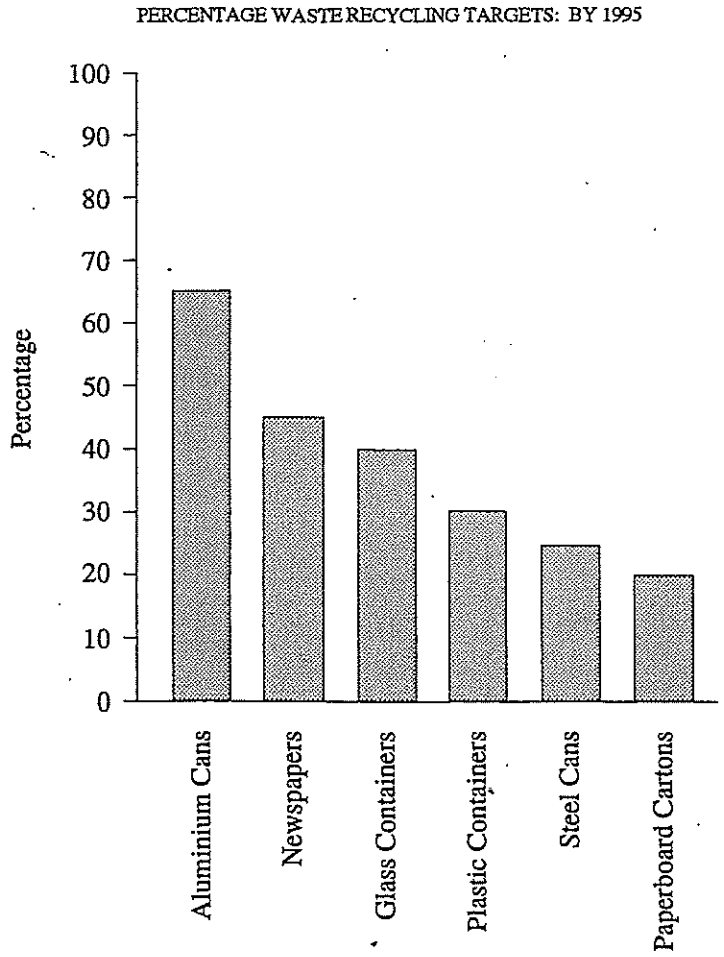
6. A train timetable from Richmond to Town Hall is shown.

Richmond to Town Hall							
	pm	pm	pm	pm	pm	pm	pm
Richmond		6.24		6.54			7.26
Blacktown	6.55	7.06	7.25	7.36	7.53	7.55	8.06
Parramatta	7.09	7.24	7.39	7.54	8.03	8.09	8.24
Granville	7.12	7.28	7.42	7.58	8.05	8.12	8.28
Lidcombe	7.20	7.33	7.50	8.03		8.20	8.33
Strathfield	7.26	7.39	7.56	8.10	8.16	8.26	8.40
Redfern	7.37	7.51	8.07	8.22		8.37	8.52
Central	7.40	7.54	8.10	8.25	8.30	8.40	8.55
Town Hall	7.43	7.57	8.13	8.28		8.43	8.58

Nicole arrives at Richmond station at 6.28 pm to catch a train to Town Hall.

According to the timetable, what is the earliest time she can arrive at Town Hall ?

7.

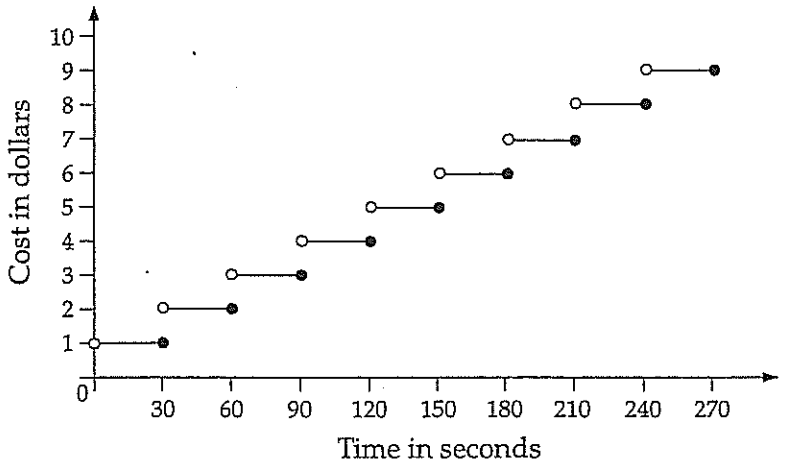


From this graph, for which item will two out of every five be recycled by 1995?

.....

.....

8. The step graph shows the cost of telephone calls lasting different lengths of time.



Julie makes two telephone calls, one lasting 1 minute 32 seconds and the other lasting 1 minute 5 seconds.

What is the total cost of these two telephone calls?

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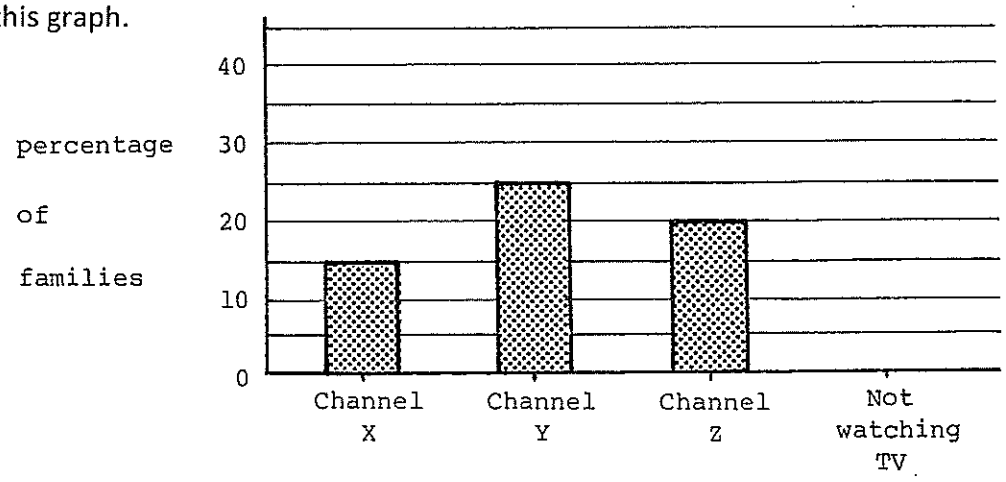
9. In a city there are three TV channels. A survey was carried out to discover which channels families were watching at 8.00 pm on 24th August, 2016. The results are shown on this graph.



i) **On the graph above**, complete the column representing the families not watching TV.

ii) The survey involved 700 families.
How many families were watching Channel Y ?

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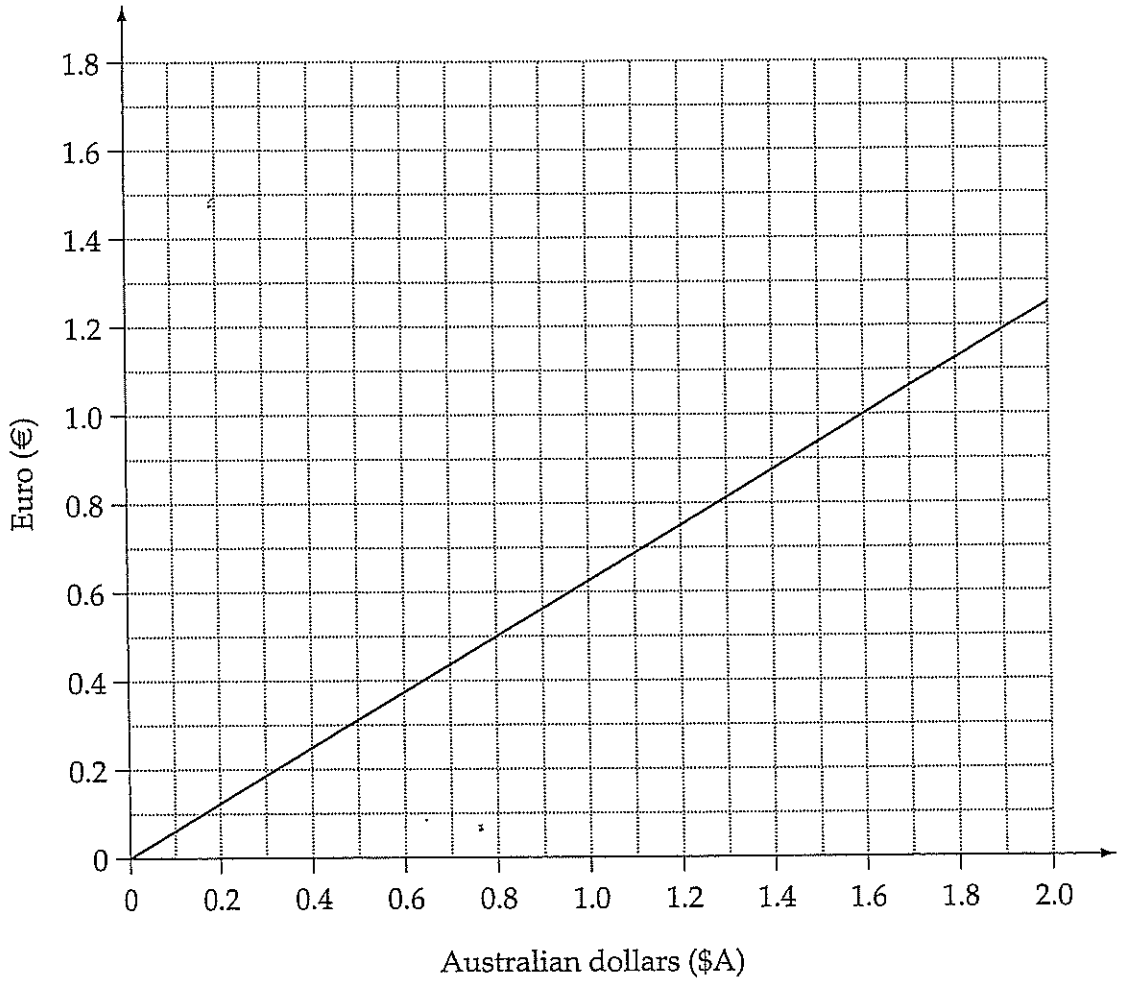
10. Scott used this graph to convert between Australian dollars ($A) and Euro (€).

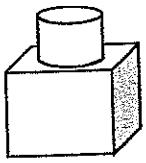


i) Scott converted 700 Euro to Australian dollars.
How much in Australian dollars did he receive ?

---

ii) A year later the exchange rate changed and Scott converted $A200 to €110.
On the graph above, draw a line that represents this exchange rate.

11.

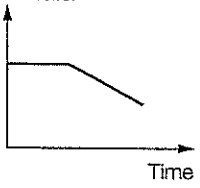


The container shown above is initially empty.

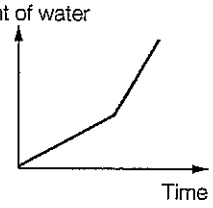
Water is then poured in at a constant rate.

Which graph below best describes this ? (circle the letter A, B, C or D)

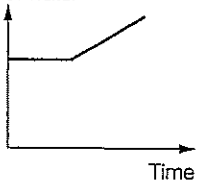
A



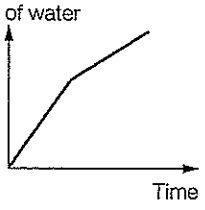
B



C

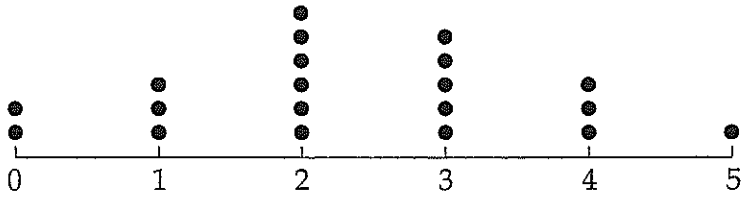


D



Section 2 : STATISTICS (14 marks)

1. This dot plot shows the number of children in 20 families.



For these scores find : a) The mode

---

b) The median

2.

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

For the data in the stem-and-leaf plot, find

a) The Mode

---

b) The median

---

3. A group of year 8 students was surveyed to find how many coins they had in their pockets. The following results were obtained :

5	3	3	5	2	1	4	2
3	2	4	5	1	0	3	4
3	1	5	4	0	4	3	4

a) Organise this information into a frequency distribution table. (2 marks)

Score (x)	Tally	Frequency (f)	f.x
	Total		

b) Find the mean of the set of scores.

---

c) Find the range of the set of scores.

---

d) Find the median of the set of scores.

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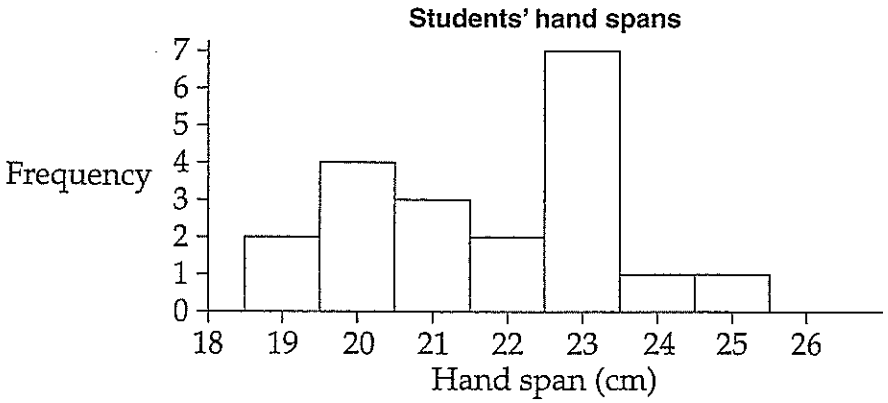
4. The hand spans of students in a class were measured. The results are displayed in the frequency histogram below.



a) Draw the frequency polygon on the frequency histogram above.

b) What is the range of the measurements of the hand spans ?

---

c) A glove manufacturer finds this sample representative of the population. Would the mean, median or mode be the most useful measure to the glove manufacturer ?

5.

Heights (cm)

15	□ 6 7 9
16	2 3 4 5 5 7 8 9
17	0 4 7 7 7
18	2 4 7 8

The stem-and-leaf plot shows the heights of 21 students in a class.

One entry (represented by □) is missing.

What is the missing entry if the range is 35 centimetres ?

---

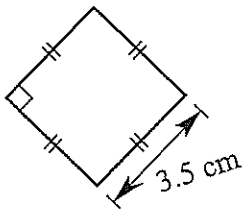
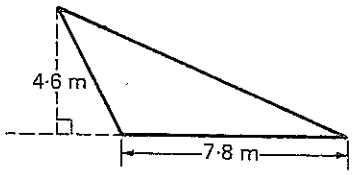
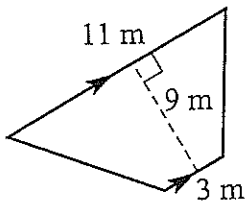
6. In Stella's first 7 games of netball the number of goals she scored was 3, 4, 5, 5, 6, 8, 9.

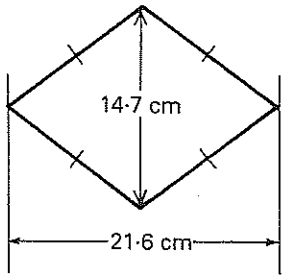
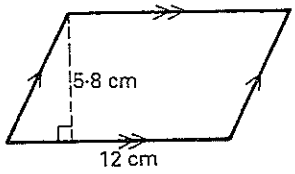
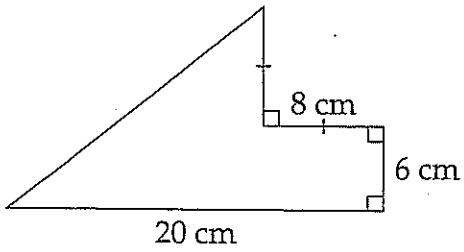
Stella's coach claims that it is possible for Stella to achieve a median of 7 and a range of 7 after three more games are completed.

Give a possible set of scores for the next three games that would allow Stella to achieve this.

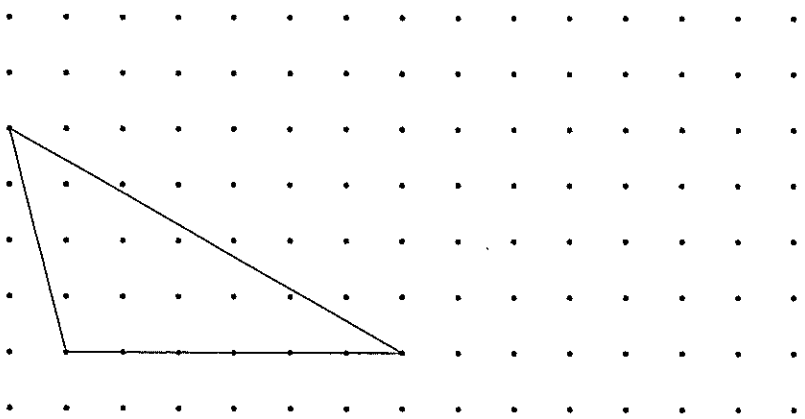
Section 3 : MEASUREMENT (14 marks)

1. Find the area of the following shapes.

a)	Answers
	
b) 	
c) 	

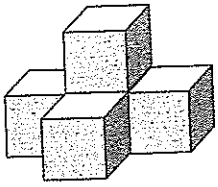
d)	Answers
	
e) 	
f) 	

2. On the dot paper draw a rectangle that has an area equal to the area of the triangle.

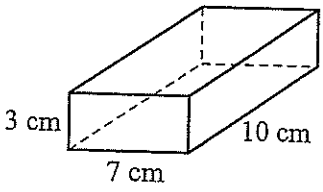


3. The following solid has been built from 1 cm cubes.

What is the surface area of the solid.

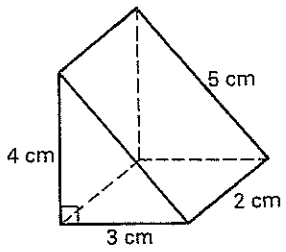


4.



Calculate the surface area of the rectangular prism.

5.



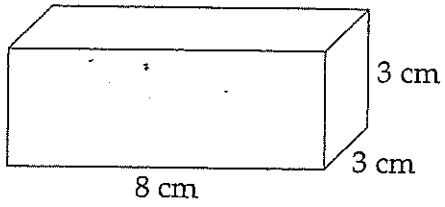
For the triangular prism above find :

a) The surface area

---

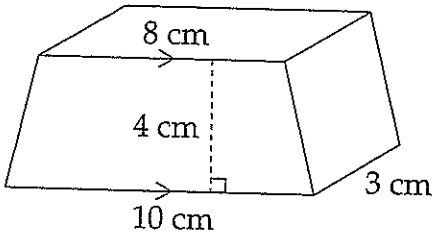
b) The volume

6.



Find the volume of the rectangular prism.

7.



Find the volume of the trapezoidal prism shown above.

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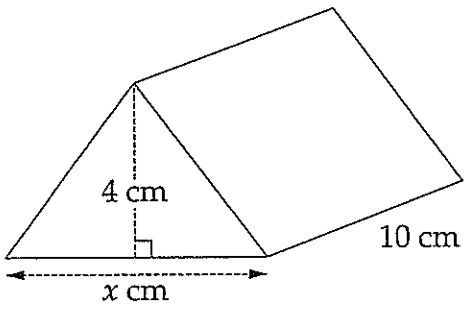
8. The triangular prism has a volume of 100 cm^3.



What is the value of x ?

Section 4 : EQUATIONS (14 marks)

1. Solve $\frac{a}{3} = 12$	2. Solve $m + 6 = 5$
3. Solve $2(3x - 1) = 31$	4. Solve $8x + 4 = 3x + 29$
5. Solve $15 - 5x = 24 - 8x$	6. Solve $5(x - 3) - (x - 1) = 6$ *(2 marks)*

7. Graph the inequality $x > -2$ on a number line.	8. Solve $3x - 1 \geq 11$ --- --- ---
9. Solve $6 - x < 4$ --- --- ---	10. Given the formula $h = 20 + 21t - 5t^2$ Find the value of h when $t = 3$. --- --- ---
11. Give the formula $v = u + at$, find the value of t when $u = 10$, $a = 5$ and $v = 80$. --- --- --- --- --- ---	12. John is four times as old as Tim. In 24 years time he will only be twice as old. a) By letting Tim's age be x, write down an equation that could be used to find the age of Tim. --- --- --- --- b) Find the current age of Tim and John. --- --- --- --- --- --- ---

Section 5 : Rates and Ratios (15 marks – 1 each)

1. Simplify 15 : 25

2. Simplify 80cm : 2 metres

3. Simplify $4x^2 : x$

4. Sue earns twice as much as Kim. What is the ratio of Kim's wage to Sue's wage ?

5. Susan and Wendy divide $540 between themselves in the ratio 5 : 4. How much does Susan receive?

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

7. Simplify 40 seconds : 4 minutes.

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

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

---

10. A coal loader can move coal at the rate of 820 tonnes per hour. How much coal does it move in a week?

---

11. A mail sorter sorts 10 800 letters in $7\frac{1}{2}$ hours. What is this rate , expressed in

i) letters per hour ?

---

ii) letters per minute ?

---

12. The ratio of supervisors to machinists in a factory is 1 : 20. How many supervisors are needed for 80 machinists ?

---

13. How long will it take a car travelling at an average speed of 45 kilometres per hour to travel 552 kilometres ?

---

14. A mixture contains olive oil and vinegar in the ratio 3 : 4. 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 ?

SYDNEY TECHNICAL HIGH SCHOOL

(Established 1911)

SOLUTIONS

YEAR 8

TERM 3 COMMON TEST

2016

Mathematics

General Instuctions

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- Calculators may be used
- All necessary working should be shown in every question
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Total marks - 75

- Attempt Questions 1 – 5
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Name : _____

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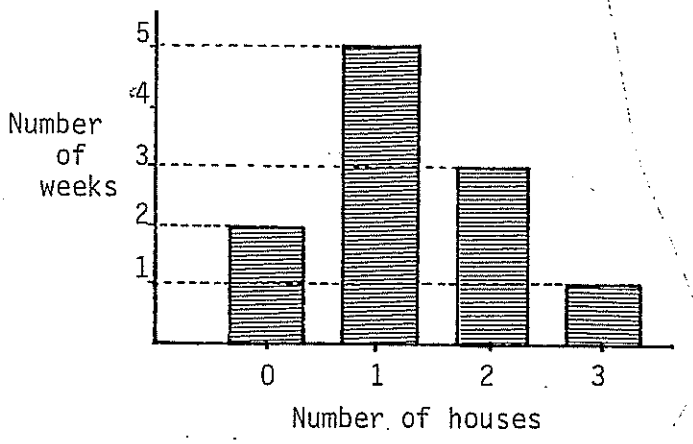
Question 1	Question 2	Question 3	Question 4	Question 5	**Total**

Section 1 : GRAPHS (14 marks)

1.

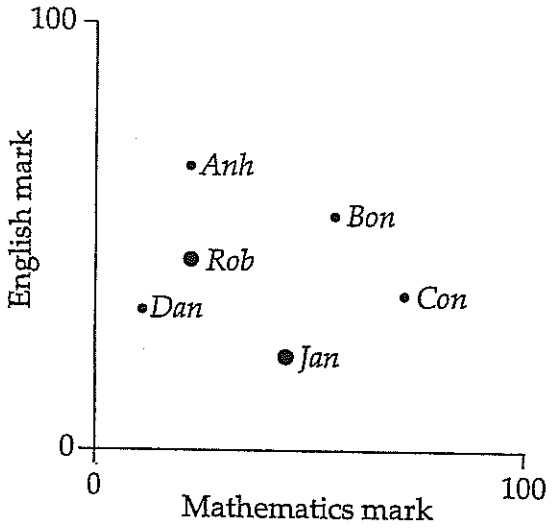


The graph shows the number of weeks a salesperson sold 0, 1, 2 or 3 houses.

For how many weeks are sales shown ?

11

2.

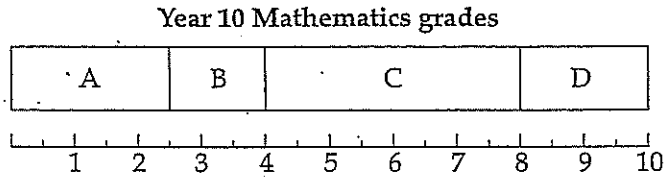


The graph shows the marks scored by a group of students in an English test and a Mathematics test.

Which student was better at Mathematics than Jan, but worse at English than Rob ?

CON

3. Use the divided bar graph to complete the frequency table.



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C	48
D	24

4.

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Walk	25
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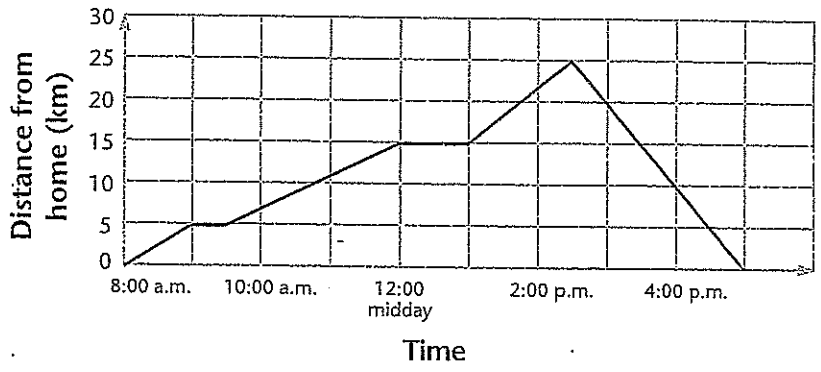
Car	10
Other	5

A survey of 200 students was taken to determine the main method of transport they use to get to school. The results appear in the table.

These results are to be represented in a sector graph. What would be the correct angle size of the sector representing students who catch the train to school ?

72°

5. The graph below shows Henry's journey on his bike.



i) Between what times did Henry have his first rest ?

9 am – 9.30 am

ii) How far did Henry travel on this journey ?

50 km

6. A train timetable from Richmond to Town Hall is shown.

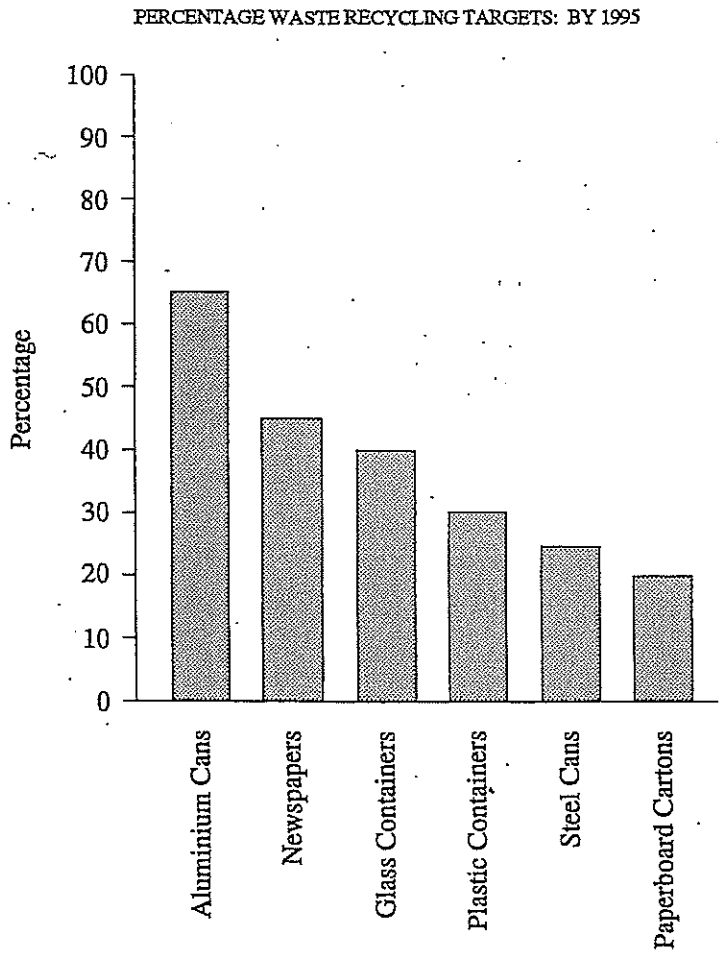
Richmond to Town Hall							
	pm	pm	pm	pm	pm	pm	pm
Richmond		6.24		6.54			7.26
Blacktown	6.55	7.06	7.25	7.36	7.53	7.55	8.06
Parramatta	7.09	7.24	7.39	7.54	8.03	8.09	8.24
Granville	7.12	7.28	7.42	7.58	8.05	8.12	8.28
Lidcombe	7.20	7.33	7.50	8.03		8.20	8.33
Strathfield	7.26	7.39	7.56	8.10	8.16	8.26	8.40
Redfern	7.37	7.51	8.07	8.22		8.37	8.52
Central	7.40	7.54	8.10	8.25	8.30	8.40	8.55
Town Hall	7.43	7.57	8.13	8.28		8.43	8.58

Nicole arrives at Richmond station at 6.28 pm to catch a train to Town Hall.

According to the timetable, what is the earliest time she can arrive at Town Hall ?

8.28

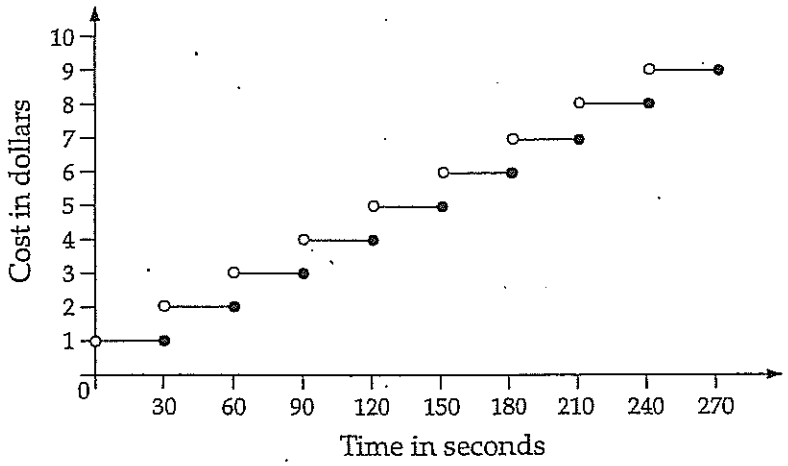
7.



From this graph, for which item will two out of every five be recycled by 1995?

Glass

8. The step graph shows the cost of telephone calls lasting different lengths of time.

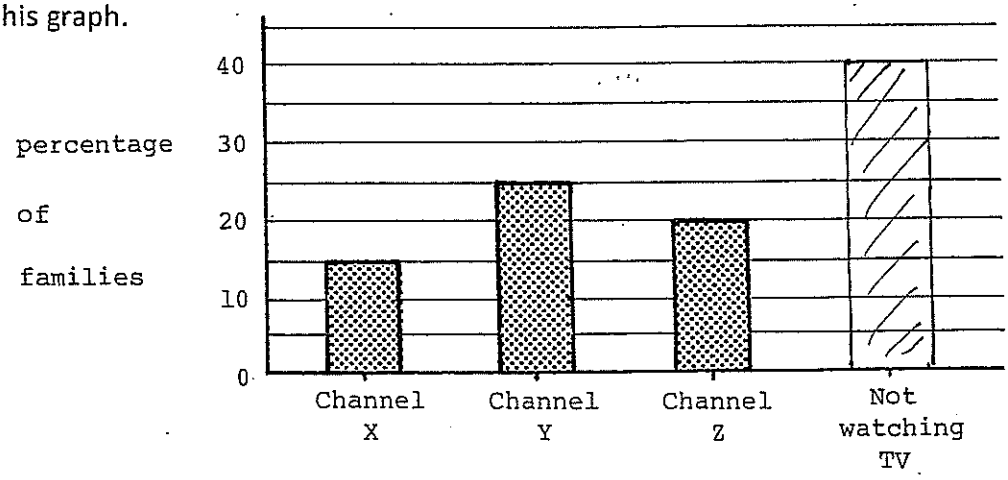


Julie makes two telephone calls, one lasting 1 minute 32 seconds and the other lasting 1 minute 5 seconds.

What is the total cost of these two telephone calls?

$4 + $3 = $7

9. In a city there are three TV channels. A survey was carried out to discover which channels families were watching at 8.00 pm on 24th August, 2016. The results are shown on this graph.

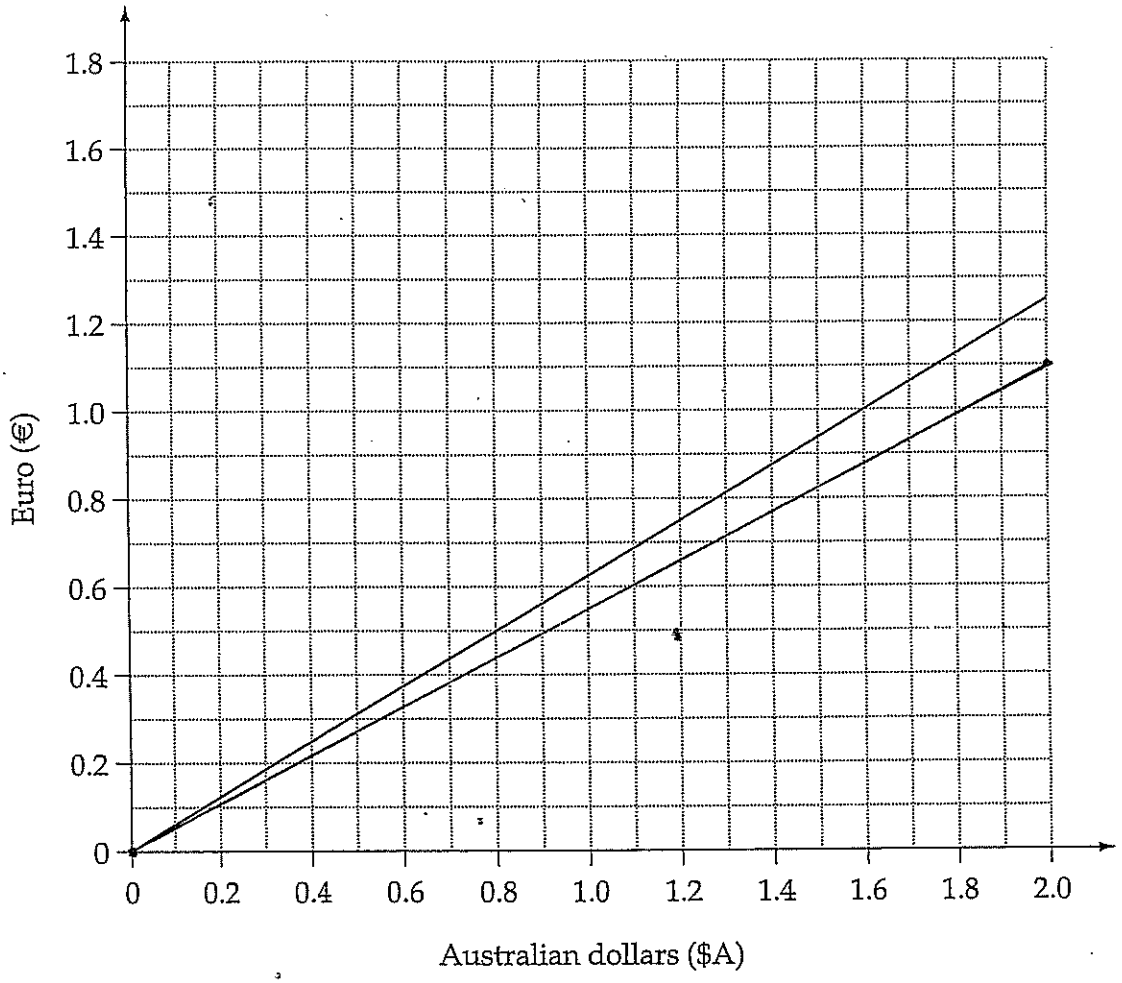


i) **On the graph above**, complete the column representing the families not watching TV.

ii) The survey involved 700 families.
How many families were watching Channel Y ?

175

10. Scott used this graph to convert between Australian dollars ($A) and Euro (€).

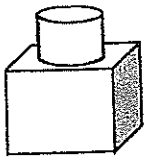


i) Scott converted 700 Euro to Australian dollars.
How much in Australian dollars did he receive ?

700 × 1.6 = $1120

ii) A year later the exchange rate changed and Scott converted $A200 to €110.
On the graph above, draw a line that represents this exchange rate.

11.

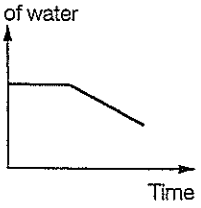


The container shown above is initially empty.

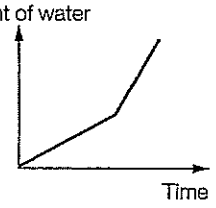
Water is then poured in at a constant rate.

Which graph below best describes this ? (circle the letter A, B, C or D)

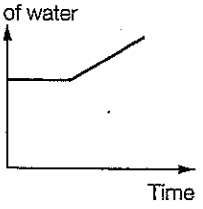
A



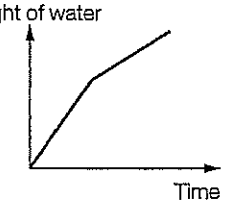
B



C

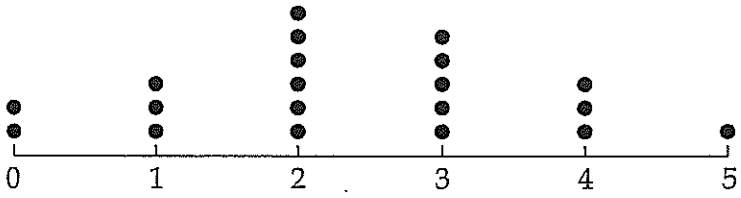


D



Section 2 : STATISTICS (14 marks)

1. This dot plot shows the number of children in 20 families.



For these scores find : a) The mode

2

b) The median

2

2.

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

For the data in the stem-and-leaf plot, find

a) The Mode

35

b) The median

32

3. A group of year 8 students was surveyed to find how many coins they had in their pockets. The following results were obtained :

5	3	3	5	2	1	4	2
3	2	4	5	1	0	3	4
3	1	5	4	0	4	3	4

a) Organise this information into a frequency distribution table. (2 marks)

Score	Tally	Frequency	f.x
0	II	2	0
1	III	3	3
2	III	3	6
3	𝍸 I	6	18
4	𝍸 I	6	24
5	IIII	4	20
		24	71

b) Find the mean of the set of scores.

$\bar{x} = \frac{71}{24} = 2\frac{23}{24}$

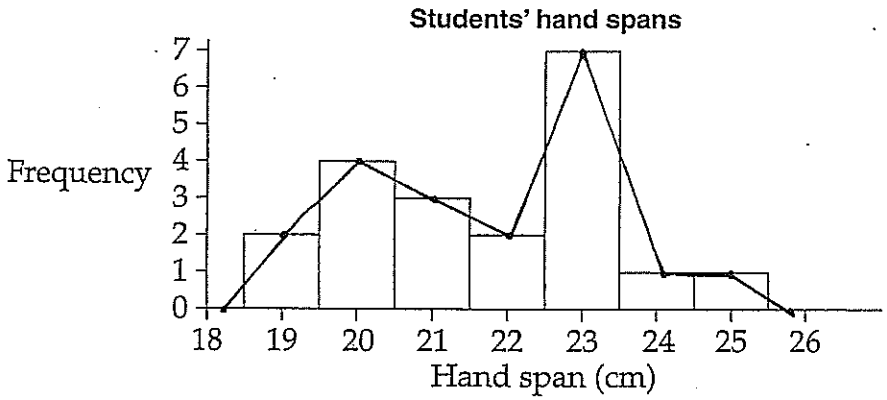
c) Find the range of the set of scores.

range = 5

d) Find the median of the set of scores.

3

4. The hand spans of students in a class were measured. The results are displayed in the frequency histogram below.



a) Draw the frequency polygon on the frequency histogram above.

b) What is the range of the measurements of the hand spans ?

range = 25 - 19

= 6

c) A glove manufacturer finds this sample representative of the population. Would the mean, median or mode be the most useful measure to the glove manufacturer ?

mode

5.

Heights (cm)

15	□ 6 7 9
16	2 3 4 5 5 7 8 9
17	0 4 7 7 7
18	2 4 7 8

$188 - \square = 35$

The stem-and-leaf plot shows the heights of 21 students in a class.

One entry (represented by □) is missing.

What is the missing entry if the range is 35 centimetres ?

3

6. In Stella's first 7 games of netball the number of goals she scored was 3, 4, 5, 5, 6, 8, 9.

Stella's coach claims that it is possible for Stella to achieve a median of 7 and a range of 7 after three more games are completed.

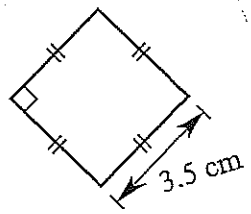
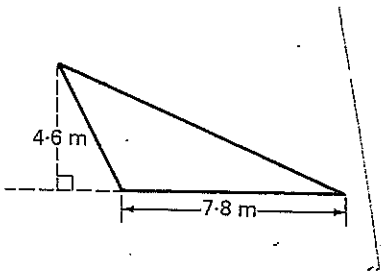
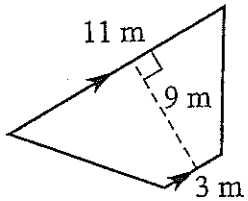
Give a possible set of scores for the next three games that would allow Stella to achieve this.

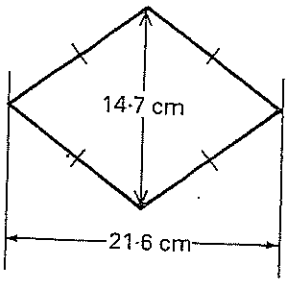
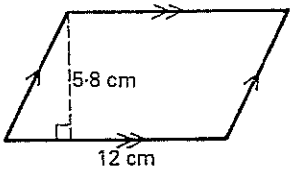
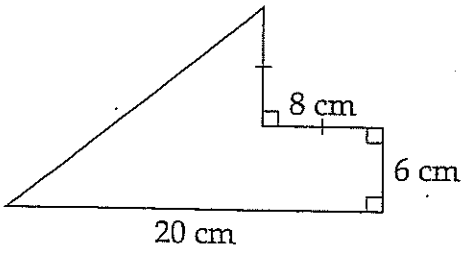
3 4 5 5 6 8 9 10 10 10

10 10 10 many possible answers

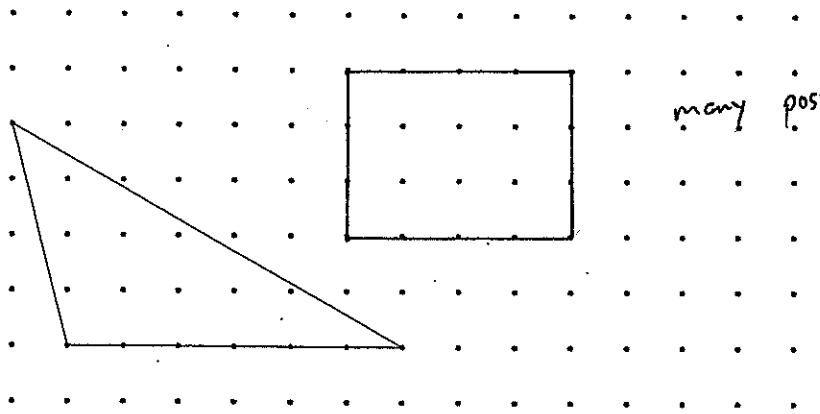
Section 3 : MEASUREMENT (14 marks)

1. Find the area of the following shapes.

	Answers
a) 	$A = 3.5^2$ $= 12.25 \text{ cm}^2$
b) 	$A = \frac{1}{2} \times 7.8 \times 4.6$ $= 17.94 \text{ m}^2$
c) 	$A = \frac{1}{2} \times 9 \times (11 + 3)$ $= 63 \text{ m}^2$

	Answers
d)  	$A = 14.7 \times 21.6 \times \frac{1}{2}$ $= 158.76 \text{ cm}^2$
e)  	* $A = 12 \times 5.8$ $= 69.6 \text{ cm}^2$
f)  	$A = 8.6 + \frac{1}{2} \times 12 \times 14$ $= 132 \text{ cm}^2$

2. On the dot paper draw a rectangle that has an area equal to the area of the triangle.



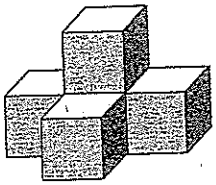
$\frac{1}{2} \times 6 \times 4 = 12$

many possible answer

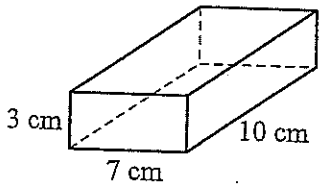
3. The following solid has been built from 1 cm cubes.

What is the surface area of the solid.

22 cm²



4.

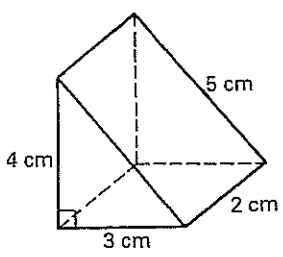


Calculate the surface area of the rectangular prism.

$A = 2 \times (7 \times 3 + 7 \times 10 + 3 \times 10)$

$= 242 \text{ cm}^2$

5.



For the triangular prism above find :

a) The surface area

$A = 5 \times 3 + 2 \times \frac{1}{2} \times 4 \times 3 + 3 \times 2 + 4 \times 2$

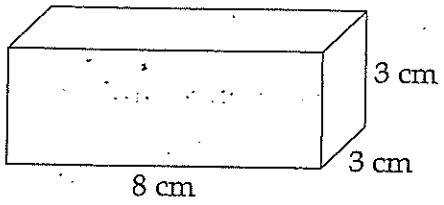
$= 36 \text{ cm}^2$

b) The volume

$V = \frac{1}{2} \times 4 \times 3 \times 2$

$= 12 \text{ cm}^3$

6.

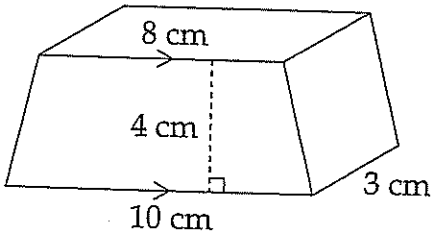


Find the volume of the rectangular prism.

$V = 8 \times 3 \times 3$

$= 72 \text{ cm}^3$ ← units must be correct

7.

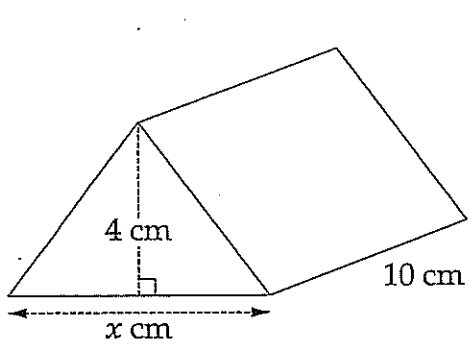


Find the volume of the trapezoidal prism shown above.

$V = \frac{1}{2} \times 4 \times (8 + 10) \times 3$

$= 108 \text{ cm}^3$

8. The triangular prism has a volume of 100 cm^3.



What is the value of x ?

$\frac{1}{2} \times x \times 4 \times 10 = 100$

$x = 5$

Section 4 : EQUATIONS (14 marks)

1. Solve $\frac{a}{3} = 12$

$a = 36$

2. Solve $m + 6 = 5$

$m = -1$

3. Solve $2(3x - 1) = 31$

$6x - 2 = 31$

$6x = 33$

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

4. Solve $8x + 4 = 3x + 29$

$5x = 25$

$x = 5$

5. Solve $15 - 5x = 24 - 8x$

$15 = 24 + 3x$

$3x = 9$

$x = 3$

6. Solve $5(x - 3) - (x - 1) = 6$ *(2 marks)*

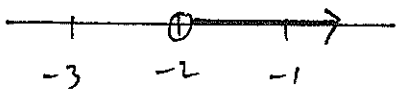
$5x - 15 - x + 1 = 6$

$4x - 14 = 6$

$4x = 20$

$x = 5$

7. Graph the inequality $x > -2$ on a number line.



8. Solve $3x - 1 \geq 11$

$3x \geq 12$

$x \geq 4$

9. Solve $6 - x < 4$

$-x < -2$

$x > 2$

10. Given the formula $h = 20 + 21t - 5t^2$

Find the value of h when $t = 3$.

$h = 20 + 21 \times 3 - 5 \times 3^2$

$= 38$

11. Give the formula $v = u + at$,

find the value of t when $u = 10$, $a = 5$ and $v = 80$.

$80 = 10 + 5t$

$70 = 5t$

$t = 14$

12. John is four times as old as Tim. In 24 years time he will only be twice as old.

a) By letting Tim's age be x, write down an equation that could be used to find the age of Tim.

$4x + 24 = 2(x + 24)$

b) Find the current age of Tim and John.

$4x + 24 = 2x + 48$

$2x = 24$

$x = 12$

$\therefore$ Tim is 12 yrs

John is 48 yrs

Section 5 : Rates and Ratios (15 marks – 1 each)

1. Simplify 15 : 25

3 : 5

2. Simplify 80cm : 2 metres

80 : 200

2 : 5

3. Simplify $4x^2 : x$

$4x : 1$

4. Sue earns twice as much as Kim. What is the ratio of Kim's wage to Sue's wage ?

1 : 2

5. Susan and Wendy divide \$540 between themselves in the ratio 5 : 4. How much does Susan receive?

Susan $= \frac{5}{9} \times 540$

$= \$300$

6. 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

7. Simplify 40 seconds : 4 minutes.

40 : 240

1 : 6

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

$\frac{5}{2} : \frac{4}{3}$

$\frac{15}{6} : \frac{8}{6}$

15 : 8

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

15×1500 mm

$= 22500$ mm

$= 22.5$ m

10. A coal loader can move coal at the rate of 820 tonnes per hour. How much coal does it move in a week?

$820 \times 24 \times 7$

$= 137760$ tonnes

11. A mail sorter sorts 10 800 letters in $7\frac{1}{2}$ hours.
What is this rate , expressed in

i) letters per hour ?

1440 letters per hour

ii) letters per minute ?

24 letters per minute

12. The ratio of supervisors to machinists in a factory is 1 : 20. How many supervisors are needed for 80 machines ?

4

13. How long will it take a car travelling at an average speed of 45 kilometres per hour to travel 552 kilometres ?

$\frac{552}{45}$ = 12 hrs 16 minutes

14. A mixture contains olive oil and vinegar in the ratio 3 : 4. 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 ?

7 : 1