

Script Marks

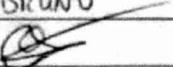
Component : 4365/1H - MATHEMATICS (LINEAR) PAPER 1 TIER H

Series : 6G13

Candidate Name	Centre Number	Candidate Number
BRUNO REDDY	11294	9000
Total Mark		
		69

Item	Mark	Comments
1	3	
2	2	
3	3	
4a	1	
4b	1	
4c	1	
5a	3	
5b	1	
6a	2	
6b	2	
7	3	
8a	1	
8b	2	
8c	3	
9	4	
10	3	
11	3	
12	3	
13a	1	
13b	1	
13c	2	
13d	1	
14a	1	
14b	2	
15a	2	
15b	2	
16	4	
17	3	

Item	Mark	Comments
18	3	
19a	1	
19b	5	
Total :	69	

Centre Number	1 1 2 9 4	Candidate Number	9 0 0 0
Surname	REDDY		
Other Names	BRUNO		
Candidate Signature			

For Examiner's Use	
Examiner's Initials	
Pages	Mark
2-3	
4-5	
6-7	
8-9	
10-11	
12-13	
14-15	
16-17	
18-19	
20-21	
22	
TOTAL	



General Certificate of Secondary Education
Higher Tier
June 2013

Mathematics (Linear)

43651H

Paper 1

Tuesday 11 June 2013 9.00 am to 10.30 am

H

For this paper you must have:

- mathematical instruments.



You must not use a calculator.

Time allowed

- 1 hour 30 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 70.
- The quality of your written communication is specifically assessed in Questions 14 and 16. These questions are indicated with an asterisk (*).
- You may ask for more answer paper during paper and graph paper. These must be tagged separately.

Log Header

Date Received 12/06/2013 05:44:58
Date Logged 13/06/2013 07:08:22

Header 1 of 1
Batch Number 1
Printed by Luz San Miguel

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4365/1H-MATHEMATICS (LINEAR)
11294 - KING SOLOMON ACADEMY

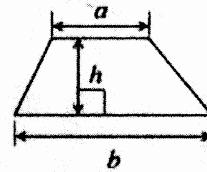


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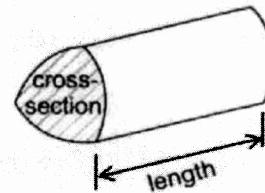
651H

Formulae Sheet: Higher Tier

$$\text{Area of trapezium} = \frac{1}{2}(a+b)h$$

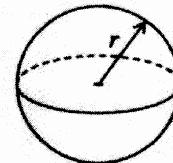


$$\text{Volume of prism} = \text{area of cross-section} \times \text{length}$$



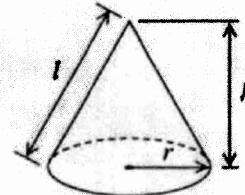
$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

$$\text{Surface area of sphere} = 4\pi r^2$$



$$\text{Volume of cone} = \frac{1}{3}\pi r^2 h$$

$$\text{Curved surface area of cone} = \pi r l$$

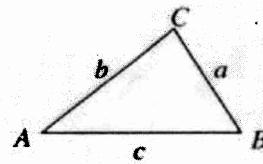


In any triangle ABC

$$\text{Area of triangle} = \frac{1}{2}ab \sin C$$

$$\text{Sine rule } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{Cosine rule } a^2 = b^2 + c^2 - 2bc \cos A$$

**The Quadratic Equation**

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

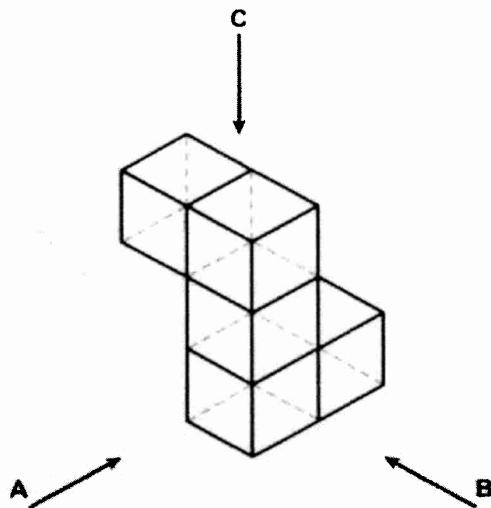
$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$



0 2

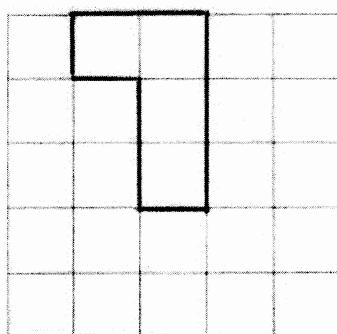
Answer all questions in the spaces provided.

- 1 This shape is made from five cubes.

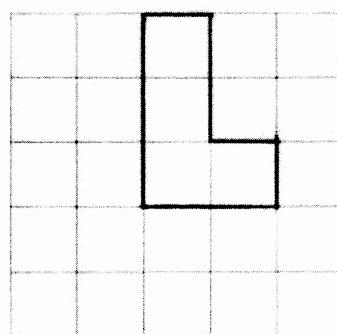


Draw what the shape looks like when seen from A, B and C.

From A

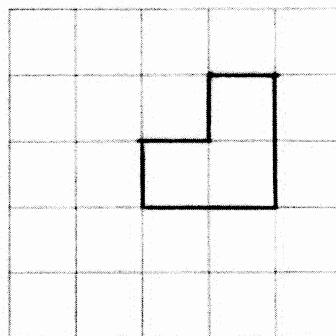


From B



1: 3

From C



(3 marks)

3

Turn over ►



0 3

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- 2 Work out an approximate value of $\frac{41 \times 198}{77}$

$$\frac{40 \times 200}{80} = \frac{8000}{80} = \frac{800}{8} = 100$$

Answer 100 (2 marks)

- 3 Which of the following expressions will give the median value when $n = 10$?

$\frac{1}{n}$	$n - 1$	$n + 1$	n^2	\sqrt{n}
0.1	9	11	100	3

You must show your working.

0.1

2: 2

3: 3

0/1 3/ ⑨ 1/ 100

Answer 9 (3 marks)



0 4

- 4 p is an even number.
 q is an odd number.

odd \times even

$$\begin{array}{r} 1 \times 2 \\ = 2 \end{array}$$

$$\begin{array}{r} 1 \times 4 \\ = 4 \end{array}$$

$$\begin{array}{r} 3 \times 2 \\ = 6 \end{array}$$

even

Tick the correct box for each part.

- 4 (a) Is pq an odd number, an even number or could it be either?

odd

even

could be either

(1 mark)

$$\text{odd} + \text{even} \quad 1 + 2 = 3 \quad 1 + 4 = 5 \quad 3 + 6 = 9 \quad \text{odd.}$$

- 4 (b) Is $3(p + q)$ an odd number, an even number or could it be either?

$$3 \times \text{odd} \rightarrow \text{odd} \times \text{odd} \quad 3 \times 1 = 3 \quad 3 \times 3 = 9 \quad 3 \times 5 = 15$$

odd

even

could be either

(1 mark)

4a: 1

4b: 1

4c: 1

- 4 (c) Is $p + q$ an integer, not an integer or could it be either?

integer

not an integer

could be either

(1 mark)

Turn over for the next question

8

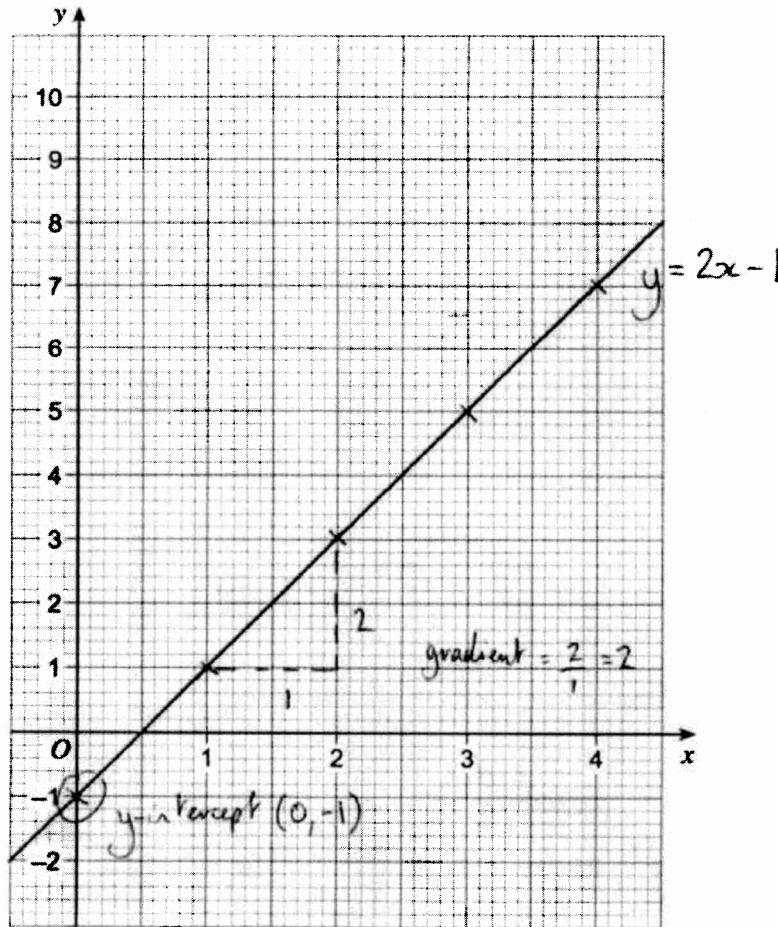
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0 5

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5 (a) Draw the graph of $y = 2x - 1$ for values of x from 0 to 4.



(3 marks)

x	0	1	2	3	4
y	-1	1	3	5	7



0 6

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5 (b) Solve $2x - 1 = 2$

$$2x - 1 = 2 \quad 2x + x + 1 = 2 + 1$$

$$2x = 3$$

$$x = 1.5$$

$$x = 1.5 \text{ or } \frac{3}{2}$$

$$\underline{2x} = \underline{3}$$

$$2 \quad 2$$

$$x = \frac{3}{2} \quad (1 \text{ mark})$$

Turn over for the next question

Check $1.5 \times 2 - 1$

$$= 3 - 1$$

$$= 2 \checkmark$$

5a: 3

5b: 1

4

Turn over ►



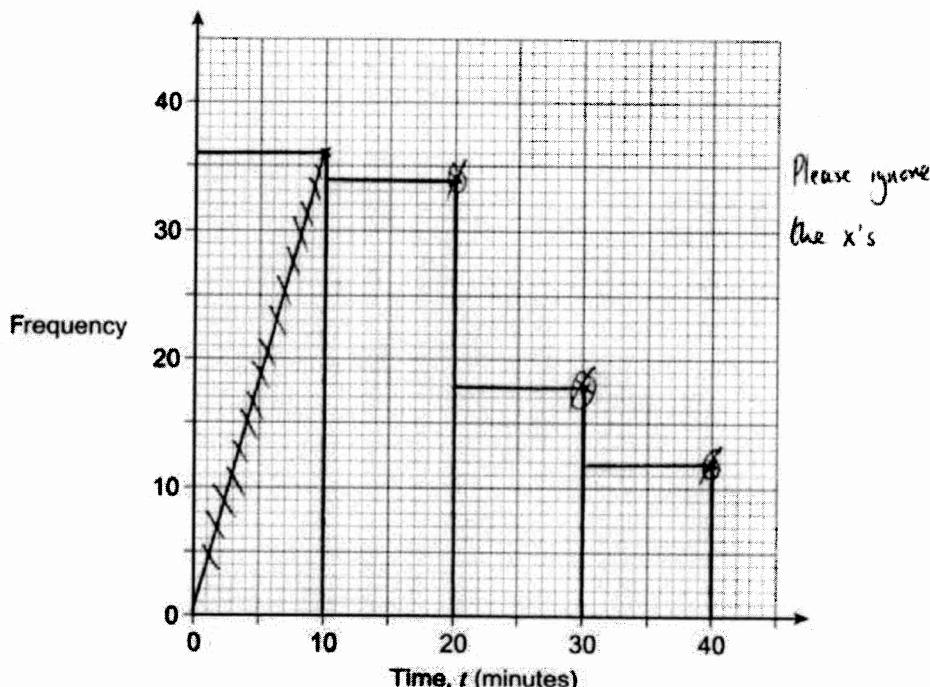
0 7

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- 6 The times taken by 100 students to travel to school are shown.

Time, t (minutes)	Frequency
$0 < t \leq 10$	36
$10 < t \leq 20$	34
$20 < t \leq 30$	18
$30 < t \leq 40$	12

- 6 (a) Draw a frequency diagram for the data.



6a: 2
6b: 2

- 6 (b) The school has 600 students.

Estimate how many students take more than 20 minutes to travel to school.

$$\begin{array}{r} (18 \times 6) + (12 \times 6) \\ 108 + 72 = 180 \end{array}$$

Answer 180

(2 marks)



0 8

7

The total number of people living in a street is 30.
 The table shows the number of people living in each house.

Number of people living in each house	Number of houses
2	4
3	3
4	a
5	1

People

8

9

 $4a$

5

$$\underline{4a + 22}$$

Work out the value of a .
 You must show your working.

7: 3

$$\begin{array}{r}
 4a + 22 = 30 \\
 -22 \\
 \hline
 4a = 8 \\
 \div 4 \\
 \hline
 a = 2
 \end{array}$$

(3 marks)

Check $2 \times 4 = 8$

$$\begin{array}{r}
 3 \times 3 = 9 \\
 4 \times 2 \checkmark = 8 \\
 5 \times 1 = 5 \\
 \hline
 30
 \end{array}$$

7

Turn over ►



0 9

8 (a) Factorise $3x - 15$

$$3(x - 5) = 3x - 15$$

Answer $3(x - 5)$ (1 mark)8 (b) Multiply out $5(y + 4t - 2)$

$$\dots \dots \dots 5y + 20t - 10$$

Answer $5y + 20t - 10$ (2 marks)8 (c) Solve $3(w + 2) = 2w - 1$

$$3w + 6 = 2w - 1 \quad -2w$$

$$w + 6 = -1 \quad -6$$

$$w = -7$$

w = - 7 (3 marks)

8a: 1

8b: 2

8c: 3

Check $3(-7 + 2) = 3 \times -5 = -15 \checkmark$

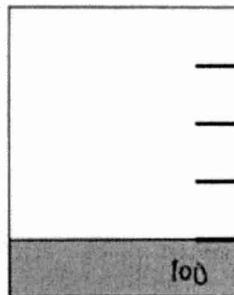
$$2 \times -7 + 1 = -14 - 1 = -15 \checkmark$$



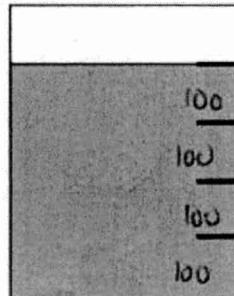
10

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- 9 When a jug is $\frac{1}{5}$ full of water it weighs 250 grams.



When the same jug is $\frac{4}{5}$ full of water it weighs 550 grams.



9: 4

How much does the jug weigh when it is empty?

$$\frac{4}{5} - \frac{1}{5} = \frac{3}{5} \quad 550 - 250 = 300$$

Let x be the weight of $\frac{1}{5}$ of water

$$\frac{3}{5}x = 300$$

$$\frac{1}{5}x = 100 \text{ Answer } 150 \text{ grams (4 marks)}$$

$$x = 100g$$

$$\therefore \text{Weight of jug} = 250 - 100 = 150g$$

$$\text{Check } 150 + (4 \times 100) = 550g \leftarrow \text{Correct for second jug.}$$

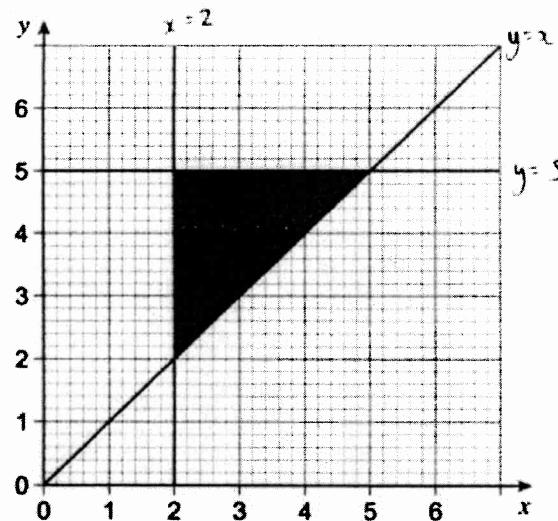
10

Turn over ►



10

Work out the three inequalities that describe the shaded region.



Answer $y \leq 5$
..... $x \geq 2$
..... $y \geq x$
(3 marks)

10: 3



1 2

11

  
 A triangle, square and pentagon have a total area of 48 cm^2 .
 The areas of the shapes are in the ratio of their number of sides.

Work out the area of the pentagon.

$$\begin{array}{r}
 3 : 4 : 5 \\
 \times 4 \quad \times 4 \quad \times 4 \\
 12 : 16 : 20 \\
 \hline
 3 + 4 + 5 = 12 \\
 48 \div 12 = 4 \\
 12 + 16 + 20 \\
 \hline
 = 48
 \end{array}$$

Answer 20 cm^2 (3 marks)

12

Rearrange $2(a + c) = 5(a - b)$ to make c the subject.

11: 3

12: 3

$$\underline{2a+2c}$$

$$\underline{a+c = \frac{5(a-b)}{2}} \quad \div \text{by } 2$$

$$\underline{c = \frac{5(a-b)}{2} - a} \quad - a$$

Answer ... $c = \frac{5(a-b)}{2} - a$ (3 marks)

9

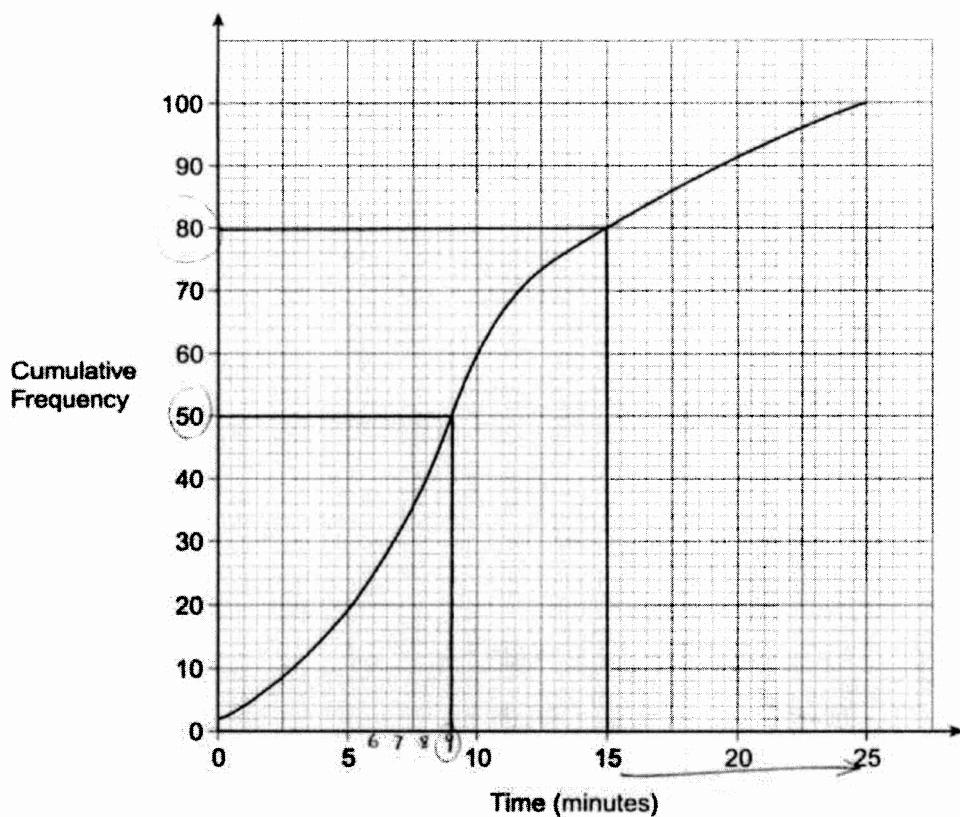
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1 3

13

The times that 100 customers spent queuing in a post office were recorded.
The cumulative frequency diagram shows the results.



13 (a) How many customers queued for more than 15 minutes?

$$\dots \quad 100 - 80 = 20$$

Answer 20 (1 mark)

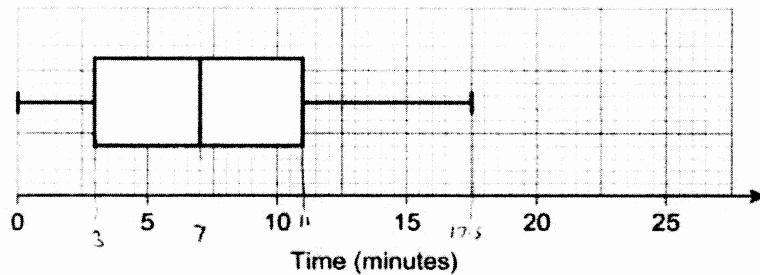
13 (b) Work out the median queuing time.

$$\dots \frac{1}{2} \text{ of } 100 = 50$$

Answer 9 minutes (1 mark)



- 13 (c) A new serving window was opened in the post office.
 The times that 100 customers spent queuing were then recorded.
 The box plot shows the results.



Work out the inter-quartile range of these times.

$$11 - 3 = 8$$

Answer minutes (2 marks)

- 13 (d) Compare the queuing times before and after the new serving window was opened.
 Give two comparisons.

13a: 1
 13b: 1
 13c: 2
 13d: 1

Comparison 1 At the second window, waiting times didn't go above 17 mins 30 secs. At the first window, the maximum wait time was up to 25 minutes. The maximum wait time at the first window appears to be longer than the maximum wait time at the second window.

Comparison 2 - The median wait time at the second window was 7 minutes, which is a shorter median wait time than at the first window where it was 9 minutes. (2 marks)

6

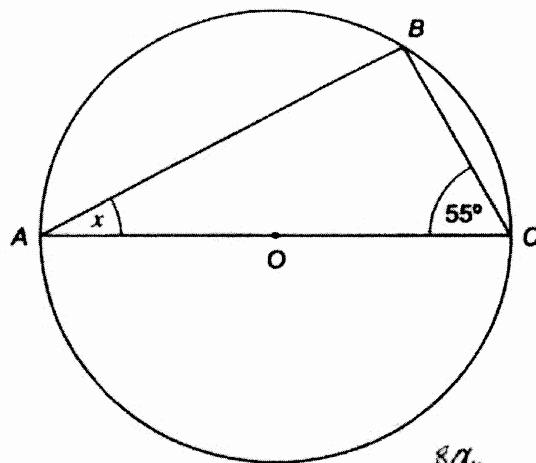
Turn over ►



15

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- 14 (a) A, B and C are points on the circumference of a circle with centre O.



Not drawn
accurately

Work out the size of angle x.

$$\begin{array}{r} 890 \\ - 55 \\ \hline 35 \end{array}$$

Answer 35 degrees

(1 mark)

✓

$$\begin{array}{r} 35 \\ + 55 \\ \hline 90 \end{array}$$

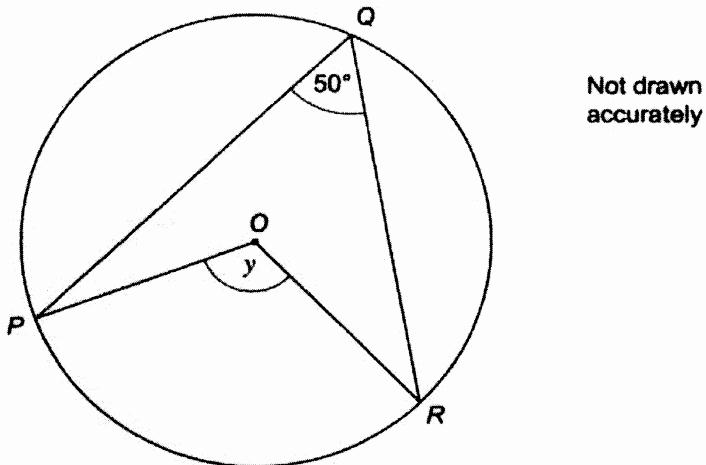
14a: 1



16

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- *14 (b) P , Q and R are points on the circumference of a circle with centre O .



Work out the size of angle y .
Give a reason for your answer.

Answer 100° degrees

14b: 2

Reason The angle at the centre is twice the angle at the circumference of the circle.
(2 marks)

Turn over for the next question

3

Turn over ►



17

15 (a) Expand and simplify

$$(3x + 2)(2x + 5)$$

$$\begin{array}{r} 6x^2 + 15x + 4x + 10 \\ \hline 6x^2 + 19x + 10 \end{array}$$

$$\begin{array}{r} 2x + 5 \\ \hline 3x | 6x^2 + 15x \\ + 2 | + 4x + 10 \end{array}$$

Answer $6x^2 + 19x + 10$

(2 marks)

15 (b) Simplify fully

$$(3x^2y^4)^2$$

$$3x^2y^4 \times 3x^2y^4$$

Answer $9x^4y^8$

(2 marks)

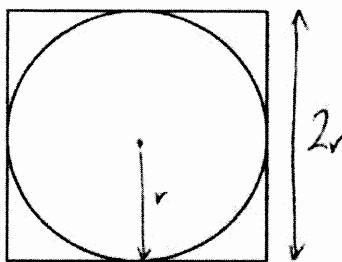
15a: 2

15b: 2



*16

A circle is drawn inside a square as shown.



Show that the area of the circle is more than 75% of the area of the square.

Let r = the radius of the circle.

Then the area of the circle is πr^2

The area of the square is $(2r)^2 = 4r^2$

$$\frac{\text{Area of circle}}{\text{Area of square}} = \frac{\pi r^2}{4r^2} \text{ which simplifies to } \frac{\pi}{4}$$

16: 4

Taking π to be 3.14, we arrive at $\frac{3.14}{4}$ or $\frac{314}{600}$,

which is greater than $\frac{300}{600}$ (or $\frac{3}{4}$), which is equivalent to 75%. (4 marks)

Turn over for the next question

Therefore the area of the circle is more than 75% of the area of the square.

8

Turn over ►



19

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17

 n is an integer.

Show that $\frac{n(n-1)}{2} + \frac{n(n+1)}{2}$ is a square number.

Expanding brackets $n^2 - n + n^2 + n$

Simplifying $\frac{2n^2}{2}$

Cancelling $\cancel{n^2}$

Conclusion: n^2 is a square number

(3 marks)

17: 3

18

The graph of $y = x^2 + 2x - 3$ is drawn on the opposite page.

Draw an appropriate straight line on the graph to work out the approximate solutions of

$$\begin{array}{r} x^2 + 2x - 3 \\ x^2 + x - 3 = 0 \\ \hline x \quad x \end{array} \text{ Subtract}$$

$$y = x$$

Answer $x = 1.3$ and $x = -2.3$

(3 marks)

Check

$$\begin{array}{r} 1.3 \\ \times 1.3 \\ \hline 3.9 \\ 130 \\ \hline 1.69 \end{array}$$

$2.99 - 3 \approx 0$

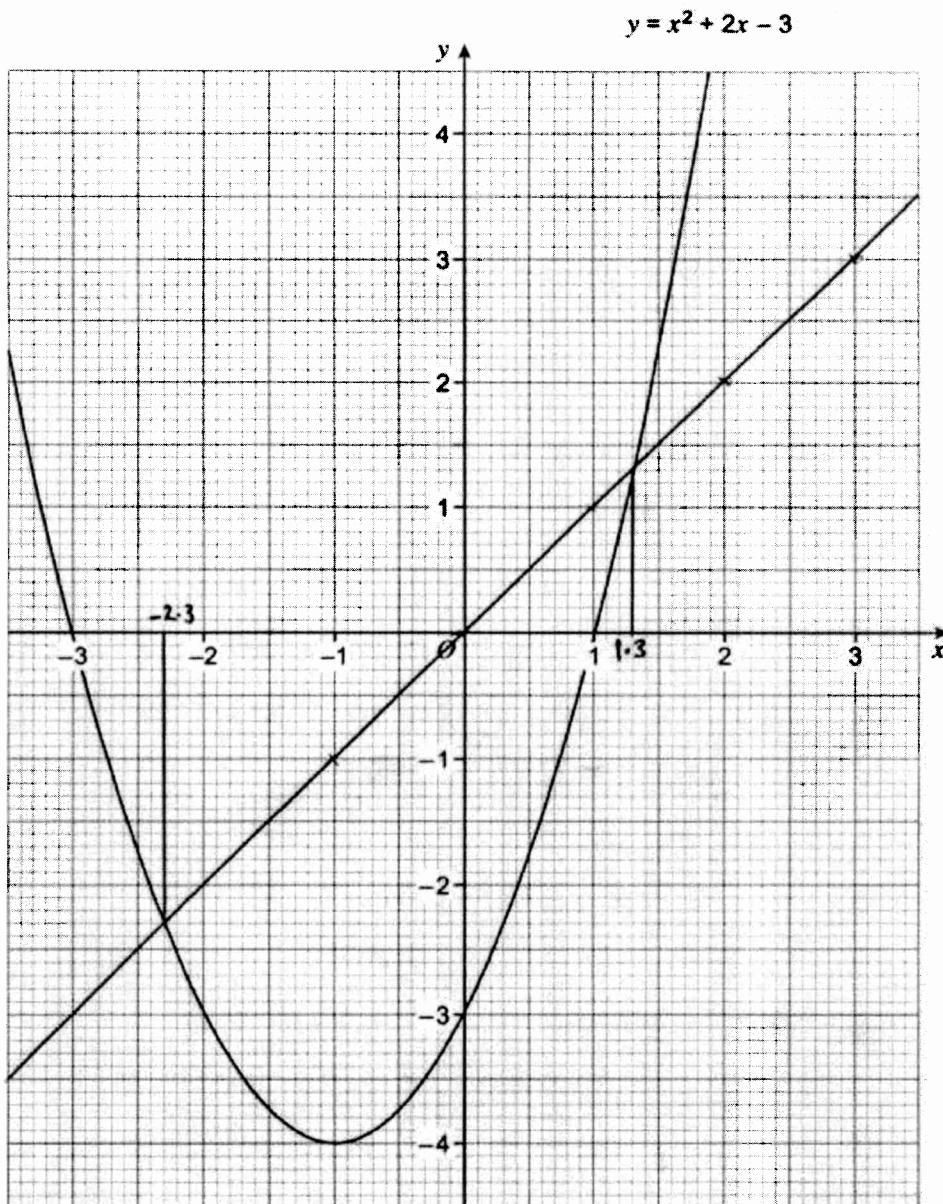
$$\begin{array}{r} 2.3 \\ \times 2.3 \\ \hline 69 \\ 460 \\ \hline 5.29 \end{array}$$

$5.29 - 2.3 - 3 \approx 0$



20

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6



2 1

- 19 (a) Show clearly that $(3\sqrt{3})^2 = 27$

$$\text{Expanding bracket} \quad \text{Rearranging} \quad \text{Partial solving}$$

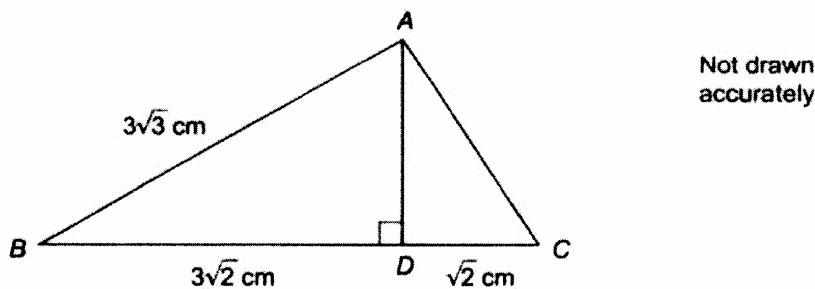
$$3\sqrt{3} \times 3\sqrt{3} = 3 \times 3 \times \sqrt{3} \times \sqrt{3} = 9 \times \sqrt{3} \times \sqrt{3} = 9 \times 3$$

$$9 \times 3 = 27$$

(1 mark)

- 19 (b) ABC is a triangle.
AD is perpendicular to BC.

$$AB = 3\sqrt{3} \text{ cm}, BD = 3\sqrt{2} \text{ cm}, DC = \sqrt{2} \text{ cm}$$



Work out the area of triangle ABC.

Give your answer in the form $a\sqrt{2}$ where a is an integer.

Using Pythagoras to find AD (height of ABC)

$$(3\sqrt{3})^2 - (3\sqrt{2})^2 = AD^2$$

$$3\sqrt{2} \times 3\sqrt{2} \quad 27 - 18 = AD^2$$

$$= 9 \times 2 \quad 9 = AD^2$$

$$= 18 \quad 3 = AD$$

$$\text{Area } ABC = \frac{1}{2} b \times h \quad \text{Check}$$

$$= \frac{1}{2} \times (3\sqrt{2} + \sqrt{2}) \times 3 \quad \frac{1}{2} \times 4\sqrt{2} \times 3$$

$$= \frac{1}{2} \times 4\sqrt{2} \times 3 \quad \frac{1}{2} \times 4 \times 3 \times \sqrt{2}$$

$$= 2\sqrt{2} \times 3 \quad \approx 6\sqrt{2}$$

$$= 6\sqrt{2} \quad \approx 6\sqrt{2} \checkmark$$

Answer $6\sqrt{2}$ cm²

(5 marks)

6

END OF QUESTIONS



2 2

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2 3

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