Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2016

Mathematics

Unit T6 Paper 2
(With calculator)
Higher Tier

MV18

[GMT62]

WEDNESDAY 13 JANUARY, 10.45 am–12 noon

Time

1 hour 15 minutes, plus your additional time allowance.

Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Complete in blue or black ink only.
Answer **all eleven** questions.
All working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

Information for Candidates

The total mark for this paper is 50.
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in Question **1**.
You should have a ruler, compasses and a protractor.
The Formula Sheet is on pages 4 and 5.

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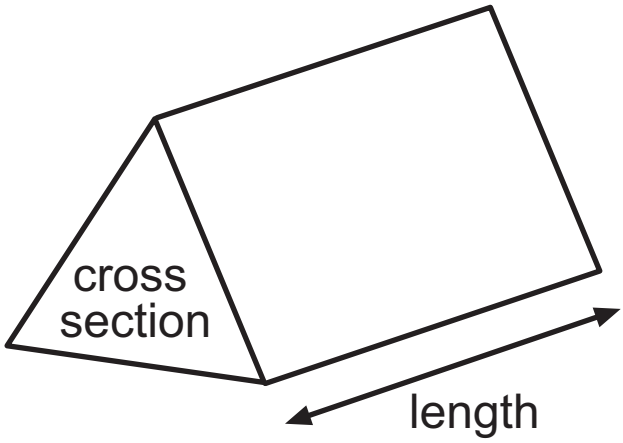
(Questions start on page 6)

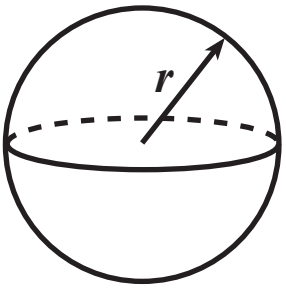
Formula Sheet

Volume of prism = area of cross section × length



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

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



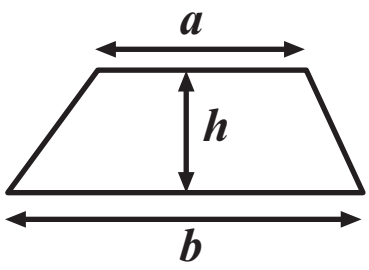
Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

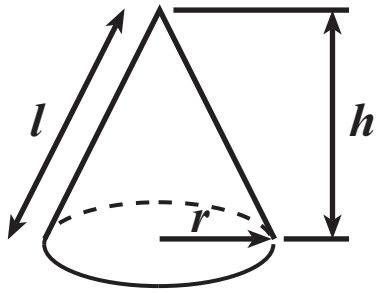
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

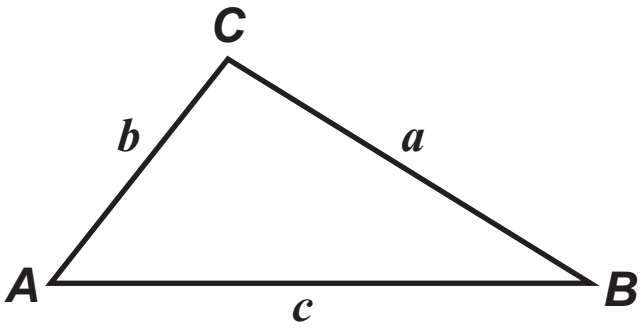


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



In any triangle *ABC*



Sine Rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$

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

Quality of written communication will be assessed in this question.

1 Zoe's annual salary is **£**27 000

Her tax free allowance is **£**9000

She pays 24**%** of the remaining salary in tax.

How much of her salary is left after tax has been deducted?

Show your working clearly. [3 marks]

Answer **£** _____

2 A bag contains only red, blue, yellow and white counters.

The table shows the probability of taking some of these colours from the bag at random.

Colour	red	blue	yellow	white
Probability	0.2	0.35		0.3

(a) Work out the probability of taking a yellow counter from the bag. [2 marks]

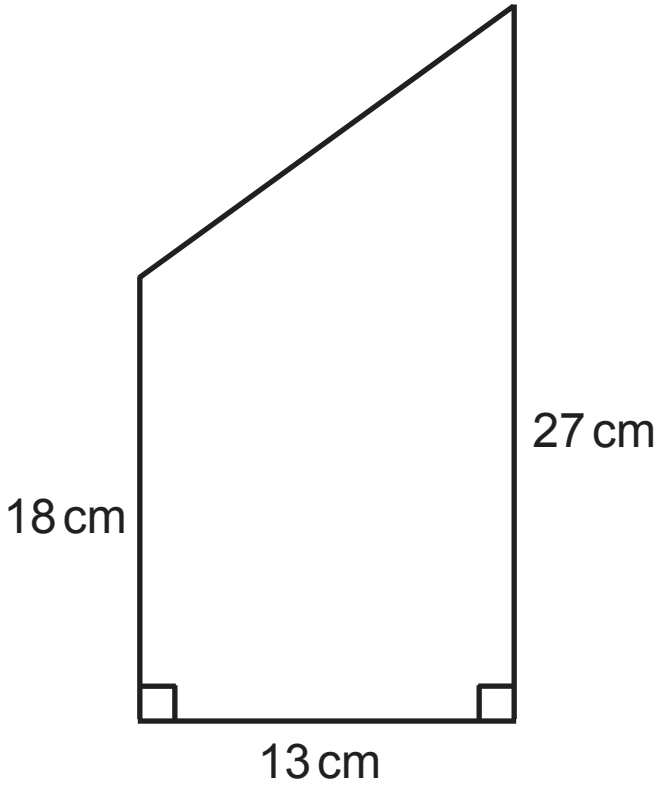
Answer _____

(b) The bag contains a total of 1500 counters.

How many blue counters would you expect the bag to contain? [2 marks]

Answer _____

3 Find the area of this trapezium. [2 marks]



Answer _____ cm^2

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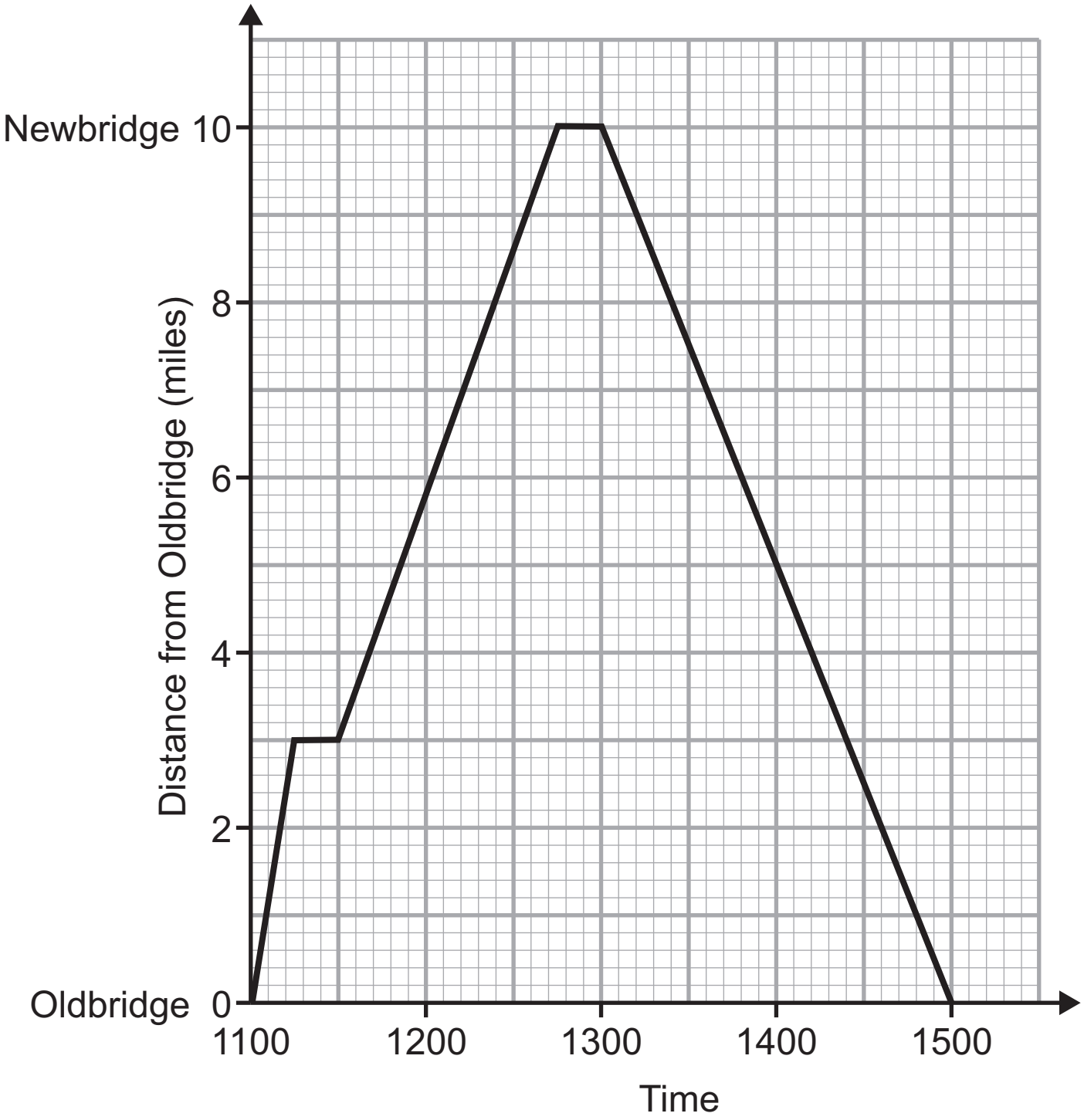
(Questions continue overleaf)

4 Harry goes for a run from Oldbridge to Newbridge and back.

His journey is shown on the graph below.



(a) What is Harry's average speed on the return journey from Newbridge to Oldbridge? [2 marks]

Answer _____ mph

(b) Between which times is Harry running at his fastest average speed? [1 mark]

Answer _____

(c) Richard leaves Newbridge at 1130 and cycles to Oldbridge, at an average speed of 18 mph.

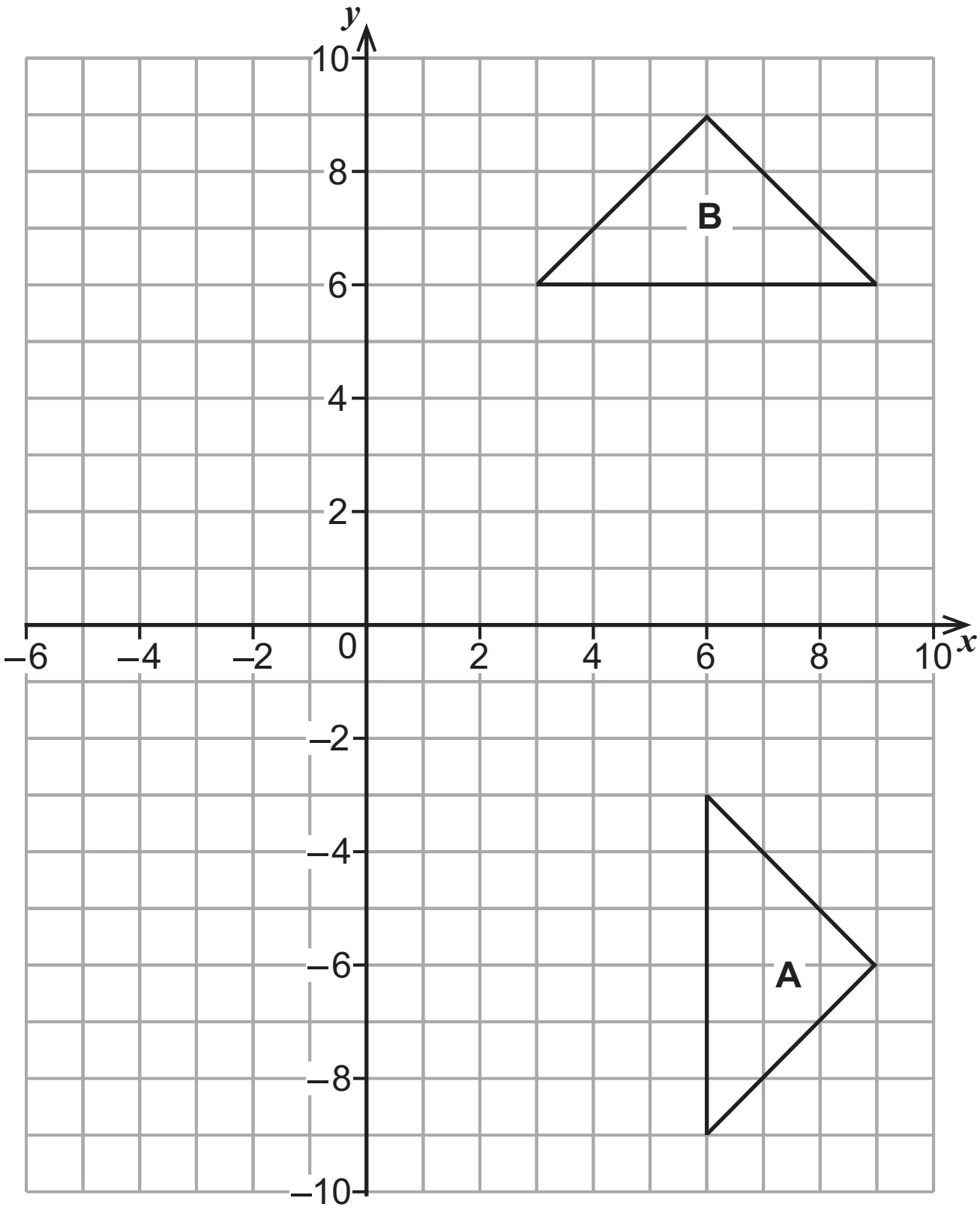
Show Richard's journey on the graph on page 10 and hence find the time when Harry and Richard pass each other. [4 marks]

Answer _____

5 **(a)** Describe fully the single transformation which moves triangle A to triangle B. [3 marks]

Answer _____

(b) Enlarge triangle A by a scale factor of $\frac{1}{3}$, using the origin as the centre of enlargement. [2 marks]


y
x
10
8
6
4
2
0
–2
–4
–6
–8
–10
–6
–4
–2
2
4
6
8
10
B
A

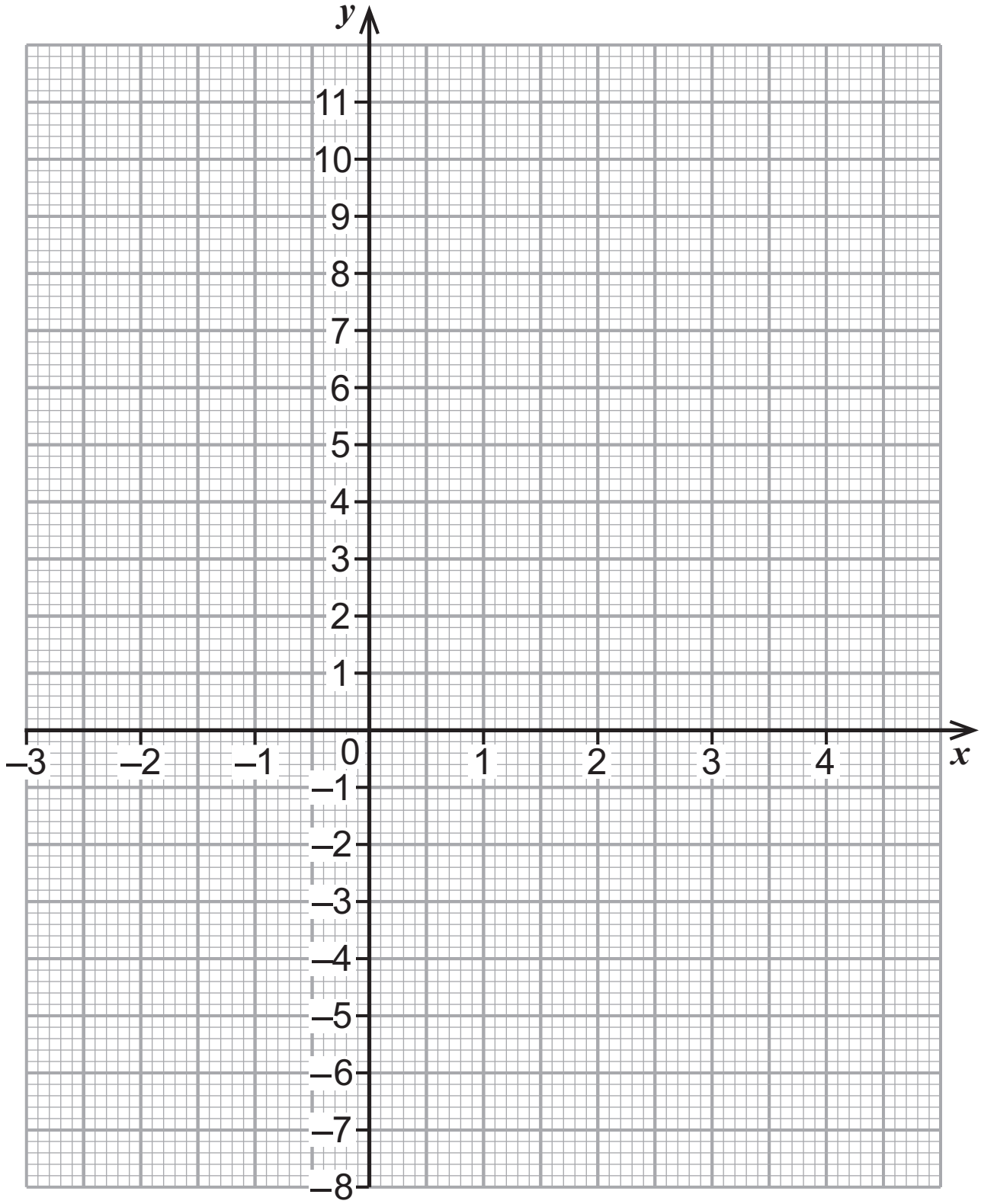
6 **(a)** Complete the table for $y = 2x^2 - 4x - 5$ [2 marks]

x	–2	–1	0	1	2	3	4
y		1	–5	–7		1	

(b) Draw the graph of $y = 2x^2 - 4x - 5$ for $x = -2$ to $x = 4$ on the opposite page. [2 marks]

(c) Draw the line $y = -2$ and find the x values of the points of intersection. [2 marks]

Answer _____


y
x
11
10
9
8
7
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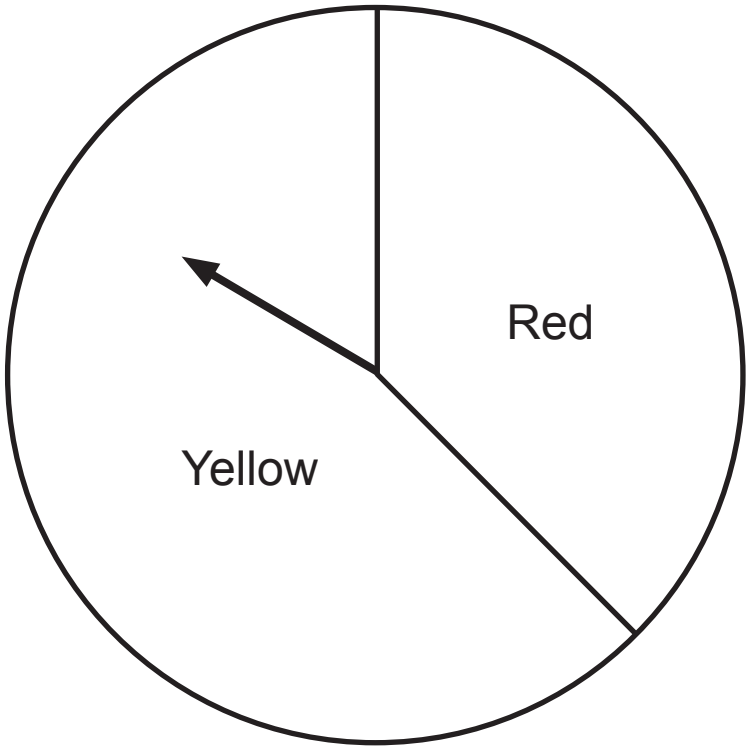
2
1
0
–1
–2
–3
–4
–5
–6
–7
–8
–3
–2
–1
1
2
3
4

7 A spinner has a red sector and a yellow sector as shown.



The arrow is spun 1000 times.

The table shows the relative frequency of the arrow landing on red after different numbers of spins.

Number of spins	Relative frequency of red
50	0.44
100	0.37
200	0.34
500	0.31
1000	0.32

(a) In the first 200 spins, how many times had the arrow landed on red? [2 marks]

Answer _____

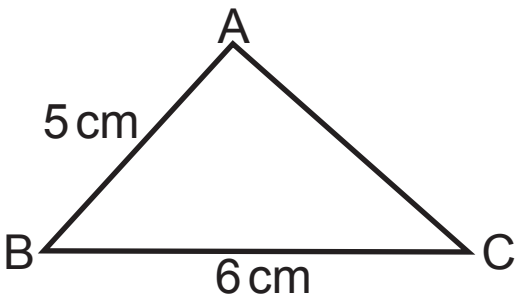
(b) Which relative frequency gives the best estimate of the probability of obtaining a red? [2 marks]

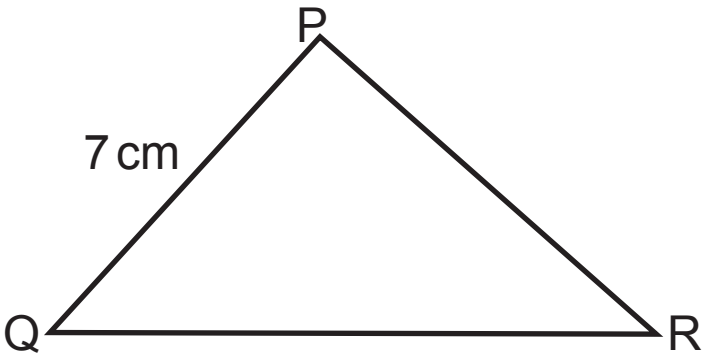
Explain your answer.

Answer _____ because _____

_____

8





Triangle ABC is similar to triangle PQR.

Find the length of the side QR. [3 marks]

Answer _____ cm

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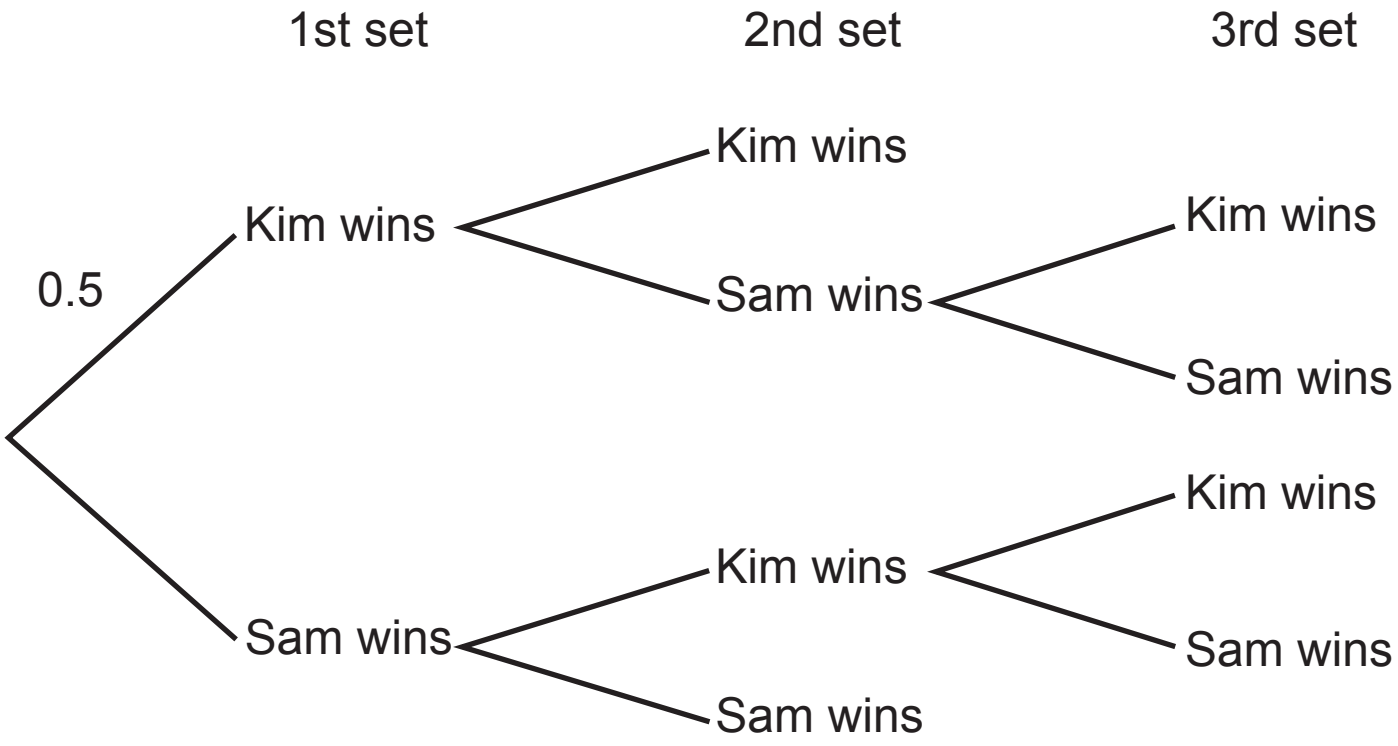
(Questions continue overleaf)

9 Kim and Sam play each other in a tennis match.

The winner of the match is the first player to win two sets.

The tree diagram shows all the possible outcomes.



The probability that Kim wins the first set is 0.5

Whenever Kim wins a set the probability that she wins the next set is 0.6

Whenever Sam wins a set the probability that Kim wins the next set is 0.7

(a) Complete the tree diagram above by writing the missing probabilities. [2 marks]

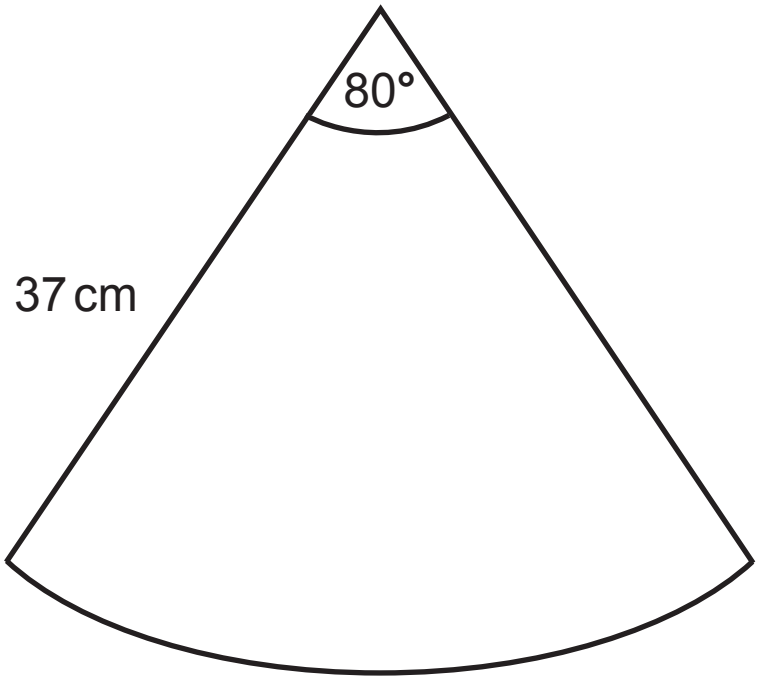
(b) Calculate the probability that Kim wins the tennis match.
[4 marks]

Answer _____

10 Rearrange $8(xy - 5) = 3y - 7x$ to make x the subject.
[4 marks]

Answer $x =$ _____

11



The net of a cone is a sector of a circle with a radius of 37 cm.

The angle in the sector is 80°

Find the volume of the cone. [6 marks]

Answer _____ cm^3

THIS IS THE END OF THE QUESTION PAPER

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For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
Total Marks	

Examiner Number

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