

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE

B391/02

METHODS IN MATHEMATICS

Methods in Mathematics 1
(Higher Tier)

MONDAY 8 JUNE 2015: Morning

DURATION: 1 hour 15 minutes
plus your additional time allowance

MODIFIED ENLARGED

Candidate forename		Candidate surname	
-------------------------------	--	------------------------------	--

Centre number						Candidate number				
--------------------------	--	--	--	--	--	-----------------------------	--	--	--	--

Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Geometrical instruments

Tracing paper (optional)

<p>WARNING NO CALCULATOR CAN BE USED FOR THIS PAPER</p>

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.

Use black ink. HB pencil may be used for graphs and diagrams only.

Answer ALL the questions.

Read each question carefully. Make sure you know what you have to do before starting your answer.

Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

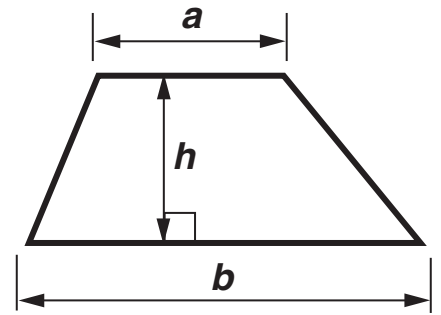
Quality of written communication will be assessed in questions marked with an asterisk (*).

The total number of marks for this paper is 60.

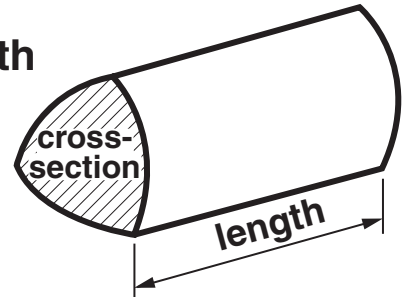
Any blank pages are indicated.

FORMULAE SHEET: HIGHER TIER

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



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

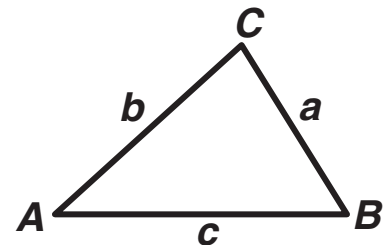


In any triangle ABC

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

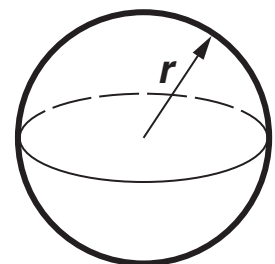
$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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



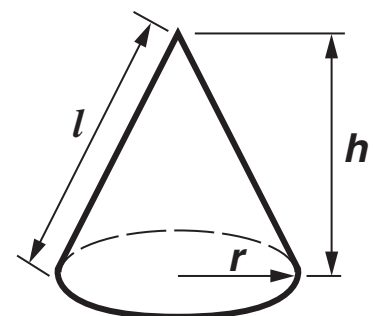
$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

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



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

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



The Quadratic Equation

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

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

Answer ALL the questions.

1 (a) $43.2 \times 78.5 = 3391.2$

Use the calculation above to find

(i) 4.32×7850 ,

(a)(i) _____ [1]

(ii) $33912 \div 0.432$.

(ii) _____ [1]

(b) ESTIMATE the value of

$$\frac{487 \times 0.032}{21.2 + 8.93}$$

You must show your working.

(b) _____ [3]

2 In each part give your answer as a fraction in its lowest terms.

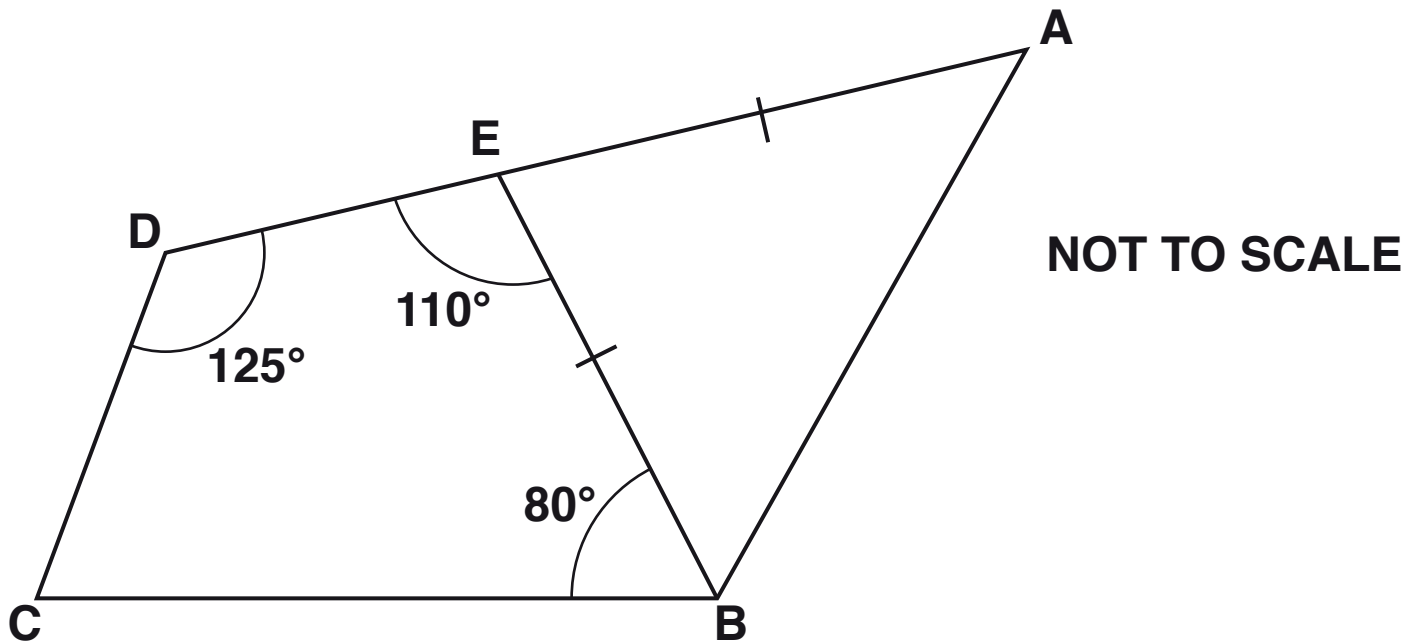
(a) Work out. $\frac{7}{8} - \frac{1}{6}$

(a) _____ [2]

(b) Work out. $\frac{28}{36} \times \frac{1}{49}$

(b) _____ [2]

- 3 BCDE is a quadrilateral.
Angle CDE = 125° , angle DEB = 110° and
angle EBC = 80° .
DEA is a straight line and $AE = BE$.



Calculate

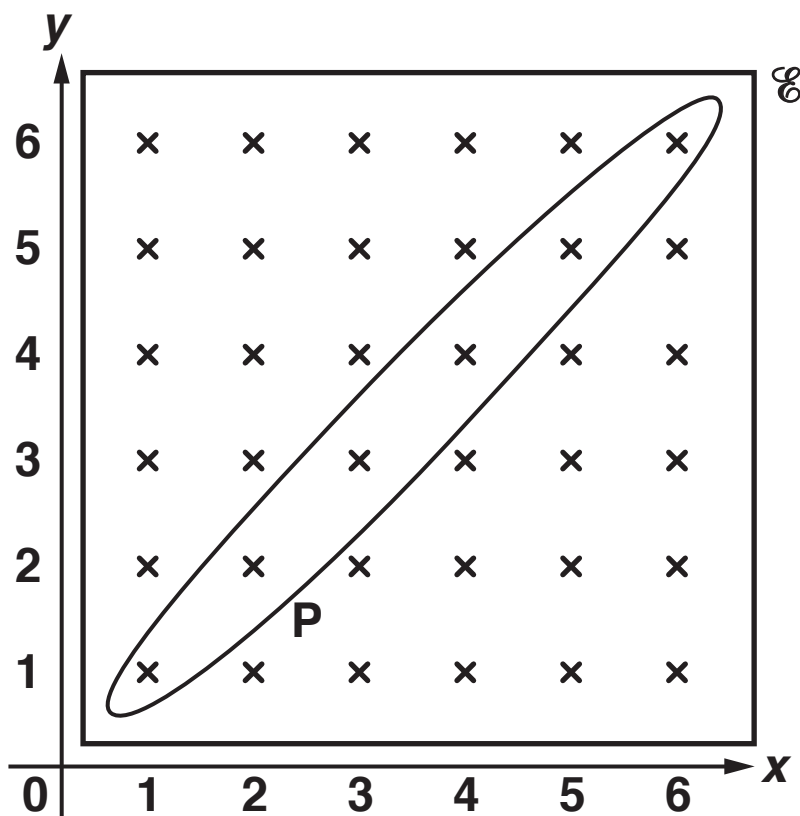
(a) angle BCD,

(a) _____ $^\circ$ [2]

(b) angle EAB.

(b) _____° [2]

4 The Venn diagram below shows the sets \mathcal{E} and P .



$\mathcal{E} = \{\text{points where each of the coordinates is an integer from 1 to 6}\}$

(a) (i) Complete this statement.

$P = \{\text{points where the } x \text{ and } y \text{ coordinates are}$
 $\underline{\hspace{10em}}\}$ [1]

(ii) $Q = \{\text{points where the } x \text{ and } y \text{ coordinates add up to 10}\}$

Show the set Q on the Venn diagram above. [1]

(b) How many members has the set $P \cap Q$?

(b) _____ [1]

(c) One of the points in \mathcal{E} is selected at random.

Find the probability that the point is a member of $P \cup Q$.

(c) _____ [2]

- 5 Lian, Hattie and Wilson collect picture cards.
Hattie has 30 more cards than Wilson.
Lian has twice as many cards as Wilson.
Altogether they have 310 cards.**

(a) Wilson has x cards. Use the information above to write down an equation in terms of x .

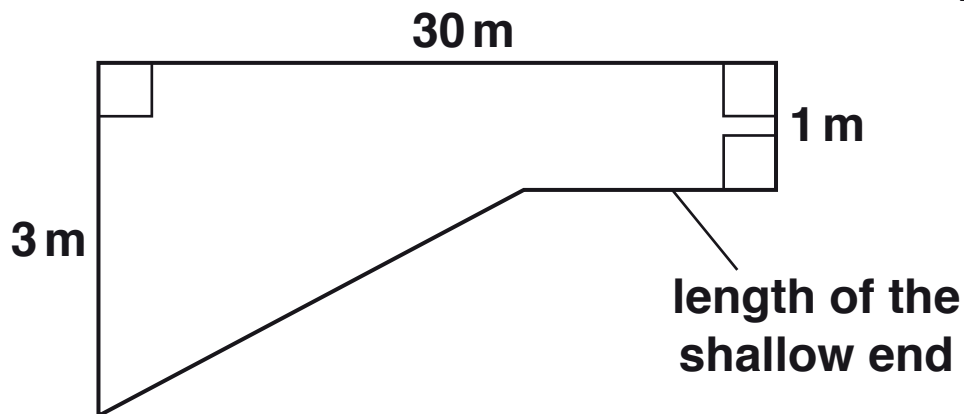
(a) _____ [2]

(b) Solve the equation in part (a) to find how many cards Wilson has.

(b) _____ [2]

- 6 The diagram shows the **CROSS-SECTION** of a swimming pool.

NOT TO SCALE



The depth of the shallow end is 1 m and the maximum depth at the deep end is 3 m.

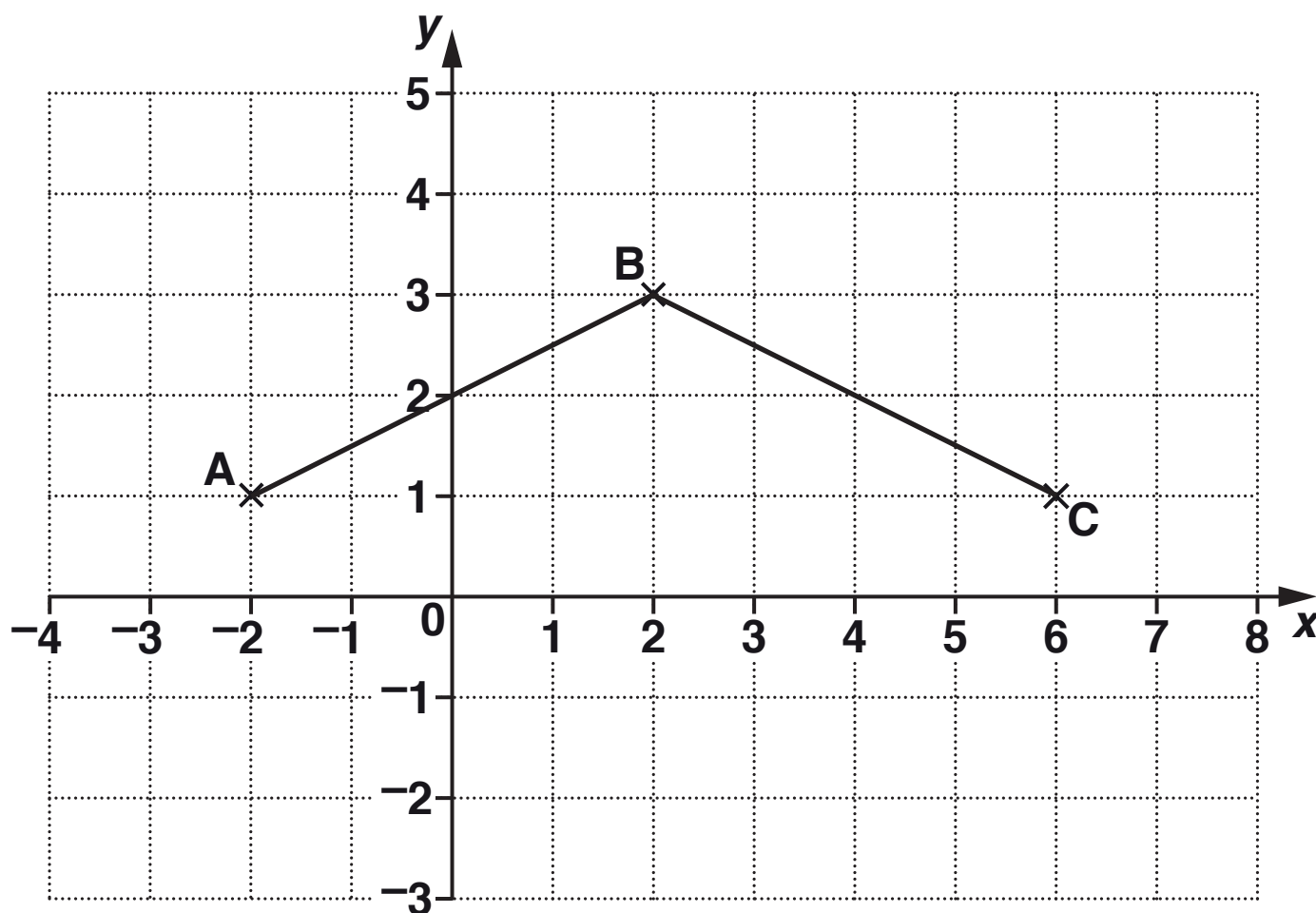
The length of the pool is 30 m.

The area of the cross-section of the pool is 48 m^2 .

Find the length of the shallow end.

_____ m [4]

7 The points A, B and C are plotted on the grid.



(a) ABCD is a rhombus.

Write down the coordinates of the point D.

(a) (_____ , _____) [2]

(b) Find the equation of the line AB.

(b) $y =$ _____ [2]

8 (a) Simplify.

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

(a) _____ [3]

(b) Factorise completely.

$$2a^2 + 6a$$

(b) _____ [2]

- 9 (a) Work out $(8.4 \times 10^3) \times (1.5 \times 10^{-8})$.
Give your answer in standard form.

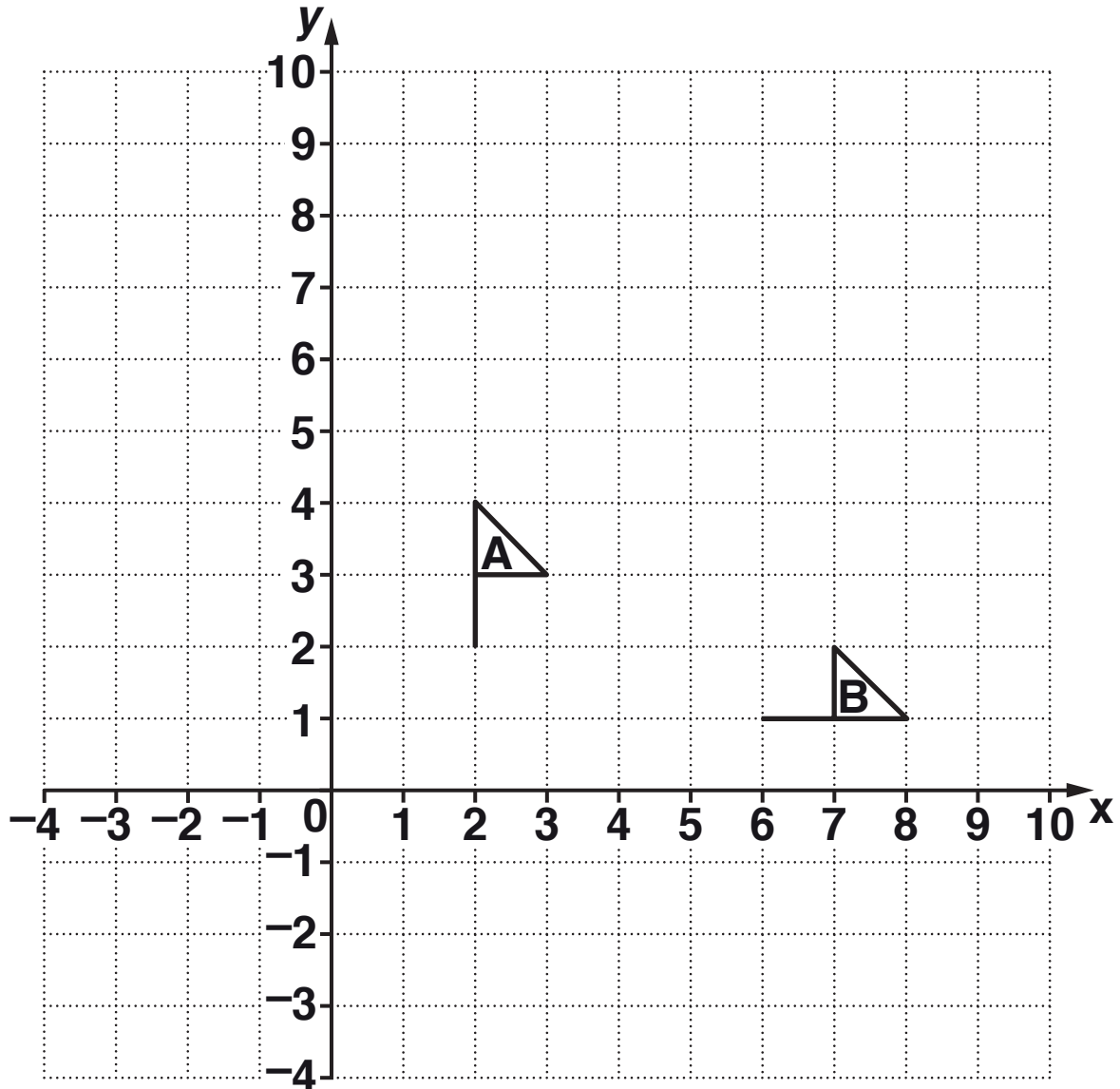
(a) _____ [2]

- (b) The distance from the Sun to the Earth is
149 600 000 km.
Each second, light travels 299 192 km.

By approximating the numbers and writing them
in standard form,
ESTIMATE the time, in seconds, it takes for light
from the Sun to reach the Earth.

(b) _____ seconds [4]

10 Two flags, A and B, are shown on the coordinate grid.



Flag A can be transformed to flag B by a rotation followed by a reflection.

Complete the following to FULLY describe the two transformations.

Rotation _____

Reflection _____ [3]

$$11 \quad P = 5 + 2\sqrt{3}$$

$$Q = 6 - \sqrt{3}$$

Writing your answers in the form $a + b\sqrt{3}$, find

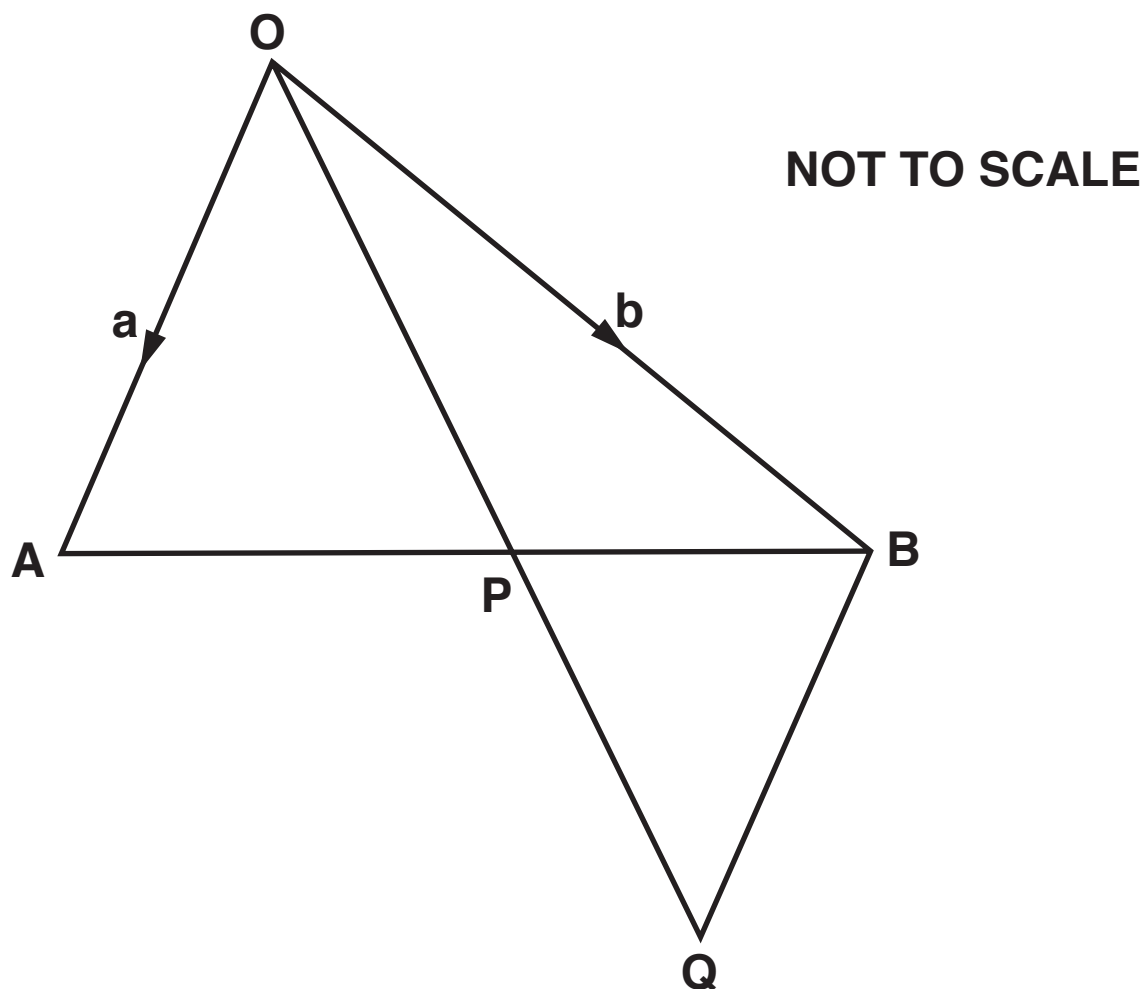
(a) $3P + 2Q$,

(a) _____ [2]

(b) $P^2 - Q^2$.

(b) _____ [4]

12* In the diagram $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.



The point P divides AB in the ratio 3 : 2 and OQ in the ratio 3 : 2.

Prove, USING VECTORS, that BQ is parallel to OA. [5]

13 Amy and Bishan are playing a dice game with a normal fair dice.

If it lands on 1, Amy wins and the dice is not thrown again.

If it lands on 6, Bishan wins and the dice is not thrown again.

If it lands on any other number, it is thrown again.

(a) What is the probability that the game is won in either one or two throws?

(a) _____ [3]

- (b) Write down an expression, in terms of n , for the probability that Amy wins on the n th throw.

(b) _____ [2]

END OF QUESTION PAPER

BLANK PAGE

BLANK PAGE

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

