Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	4	H	Signature

Paper Reference(s)

5384H/14H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 14 (Calculator)

Higher Tier

Unit 3

Friday 10 June 2011 – Morning

Time: 1 hour 10 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 17 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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Turn over

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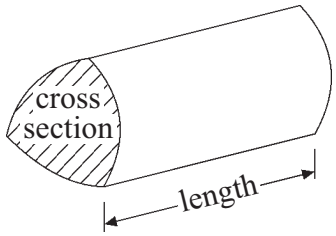
GCSE Mathematics

Formulae: Higher Tier

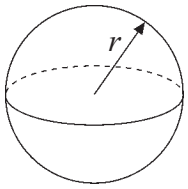
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



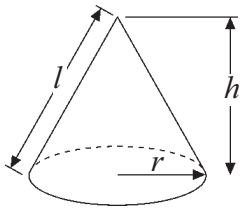
Volume of sphere $= \frac{4}{3}\pi r^3$

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

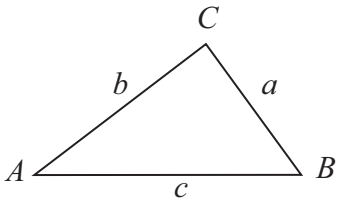


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



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

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

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

The Quadratic Equation

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

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

Leave blank

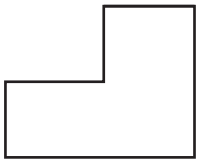
Answer ALL SEVENTEEN questions.

Write your answers in the spaces provided.

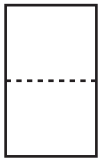
You must write down all the stages in your working.

1. Here are the front elevation, side elevation and plan of a 3-D shape.

Front elevation



Side elevation



Plan

In the space below, draw a sketch of the 3-D shape.

Q1

(Total 2 marks)

Leave blank

2. Bob has 120 beads.
The beads are either red or green.

Bob gives $\frac{3}{4}$ of the beads to his friend.

$\frac{2}{3}$ of the beads Bob now has are red.

Work out how many green beads Bob now has.

.....

Q2

(Total 3 marks)

3. The diagram shows 3 sides of a regular polygon.

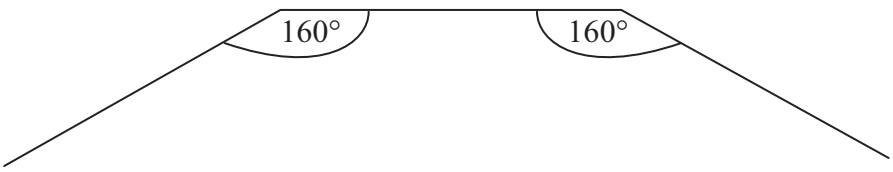


Diagram **NOT** accurately drawn

Each interior angle of the regular polygon is 160°.

Work out the number of sides of the regular polygon.

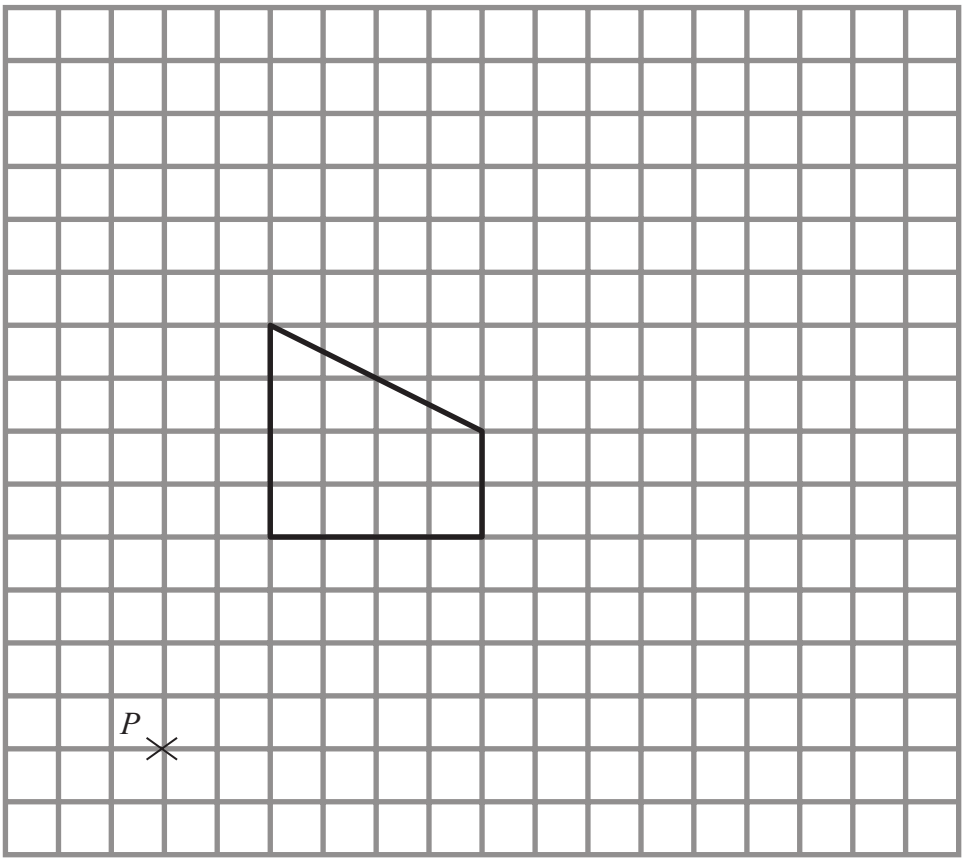
.....

Q3

(Total 3 marks)

Leave blank

4.



On the grid, enlarge the shape with a scale factor of $\frac{1}{2}$, centre *P*.

Q4

(Total 3 marks)

5. In 2009, Stephen's annual salary was £27 120
In 2010, Stephen's annual salary increased by 2.5%.

In 2009, Michelle earned £2100 each month.
In 2010, Michelle received an increase of £200 per month.

In 2010, who had the larger salary, Stephen or Michelle?
You must show all of your working.

.....

Q5

(Total 4 marks)

Leave blank

6. The equation

$$x^3 + 5x = 67$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **ALL** your working.

x = ...

Q6

(Total 4 marks)

7. Use your calculator to work out the value of

$$\frac{2.4 \times 1.6^2}{20.4 - 1.2}$$

.....

Q7

(Total 2 marks)

Leave blank

8. The diagram shows a circular pond with a path around it.

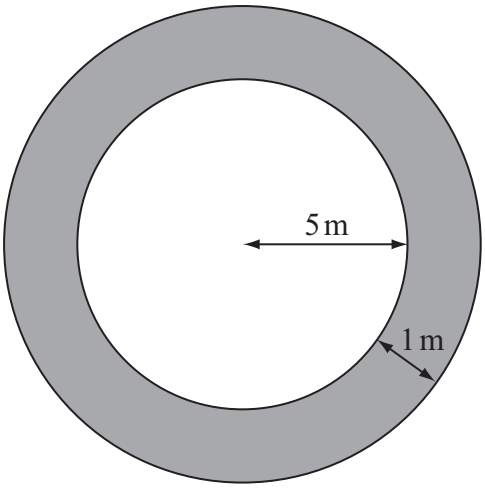


Diagram **NOT** accurately drawn

The pond has a radius of 5 m.
The path has a width of 1 m.

Work out the area of the path.
Give your answer correct to 3 significant figures.

..... m^2 **Q8**

(Total 3 marks)

Leave blank

9. (a) Solve $4(2x - 1) = 3x - 19$

x = ...

(3)

(b) Solve $\frac{y+4}{5} = 30$

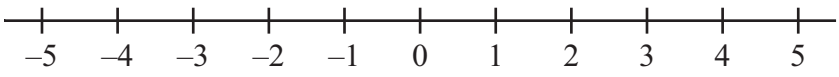
y = ...

(2) **Q9**

(Total 5 marks)

10. (a) $x > -3$

Show this inequality on the number line.



(2)

(b) Solve the inequality $7y + 36 \leqslant 8$

.....

(2) **Q10**

(Total 4 marks)

Leave blank

11. The diagram shows two similar triangles.

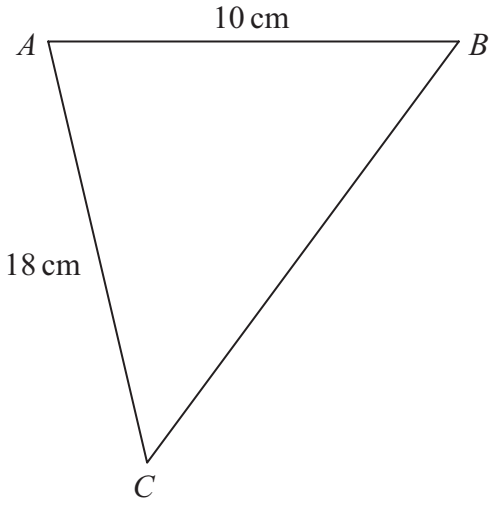
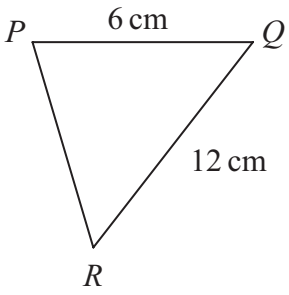


Diagram **NOT** accurately drawn



In triangle ABC, $AB = 10$ cm and $AC = 18$ cm.
In triangle PQR, $PQ = 6$ cm and $QR = 12$ cm.

Angle ABC = angle PQR.
Angle CAB = angle RPQ.

(a) Calculate the length of BC.

..... cm
(2)

(b) Calculate the length of PR.

..... cm
(2)

Q11

(Total 4 marks)

Leave blank

12. (a) Find the gradient of the straight line with equation $2x - 3y = 12$

.....

(2)

(b) Prove that the straight line with equation $2y = 10 - 3x$ is perpendicular to the straight line with equation $2x - 3y = 12$

(2) **Q12**

(Total 4 marks)

13.

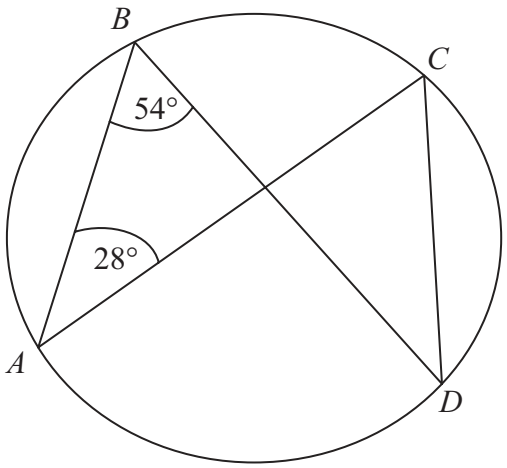


Diagram **NOT** accurately drawn

A, B, C and D are points on the circumference of a circle.
Angle $ABD = 54°$.
Angle $BAC = 28°$.

(i) Find the size of angle ACD.

..... °

(ii) Give a reason for your answer.

.....

..... **Q13**

(Total 2 marks)

Leave blank

14. The surface area of Earth is 510 072 000 km^2.
The surface area of Jupiter is 6.21795×10^{10} km^2.

The surface area of Jupiter is greater than the surface area of Earth.
How many times greater?
Give your answer in standard form.

.....

Q14

(Total 3 marks)

Leave blank

15. The diagram below shows a large rectangle of length $(2x + 6)$ cm and width x cm.

A smaller rectangle of length x cm and width 3 cm is cut out and removed.

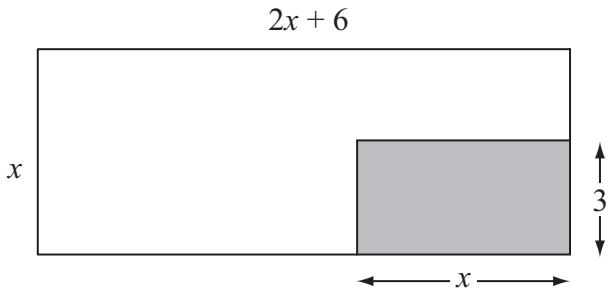


Diagram **NOT** accurately drawn

The area of the shape that is left is 100 cm^2.

(a) Show that $2x^2 + 3x - 100 = 0$

(3)

(b) Calculate the length of the smaller rectangle.
Give your answer correct to 3 significant figures.

..... cm

(4)

Q15

(Total 7 marks)

Leave blank

16.

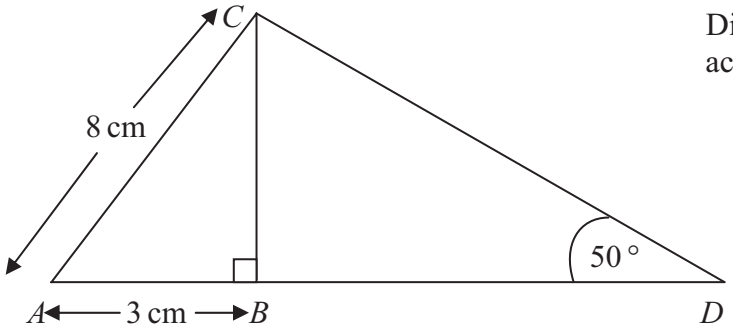


Diagram **NOT** accurately drawn

$AC = 8$ cm.
$AB = 3$ cm.
Angle ABC = angle $CBD = 90°$.
Angle $BDC = 50°$.

Calculate the length of CD.
Give your answer correct to 3 significant figures.

..... cm **Q16**

(Total 4 marks)

Leave blank

17. The voltage V of an electronic circuit is given by the formula

$$V = IR$$

where I is the current in amps
and R is the resistance in ohms.

Given that $V = 218$ correct to 3 significant figures,
$R = 12.6$ correct to 3 significant figures,

calculate the lower bound of I.

.....

Q17

(Total 3 marks)

TOTAL FOR PAPER: 60 MARKS

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