Write your name here

Surname	Other names

Edexcel Certificate

Edexcel
International GCSE

Centre Number						Candidate Number			

Mathematics A
Paper 4H

Higher Tier

Tuesday 15 January 2013 – Morning
Time: 2 hours

Paper Reference
4MA0/4H
KMA0/4H

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.
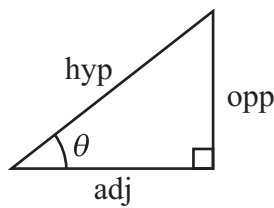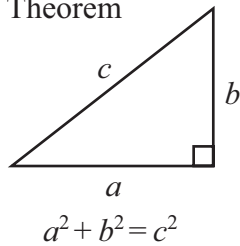
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PEARSON

International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

Pythagoras'
Theorem

$a^2 + b^2 = c^2$

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

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

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

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

$\text{adj} = \text{hyp} \times \cos\theta$
$\text{opp} = \text{hyp} \times \sin\theta$
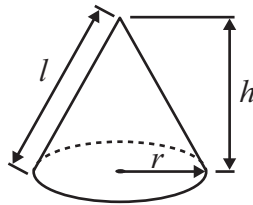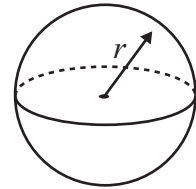$\text{opp} = \text{adj} \times \tan\theta$

or

$$\sin\theta = \frac{\text{opp}}{\text{hyp}}$$

$$\cos\theta = \frac{\text{adj}}{\text{hyp}}$$

$$\tan\theta = \frac{\text{opp}}{\text{adj}}$$

In any triangle ABC
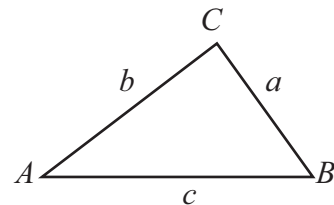
Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

Area of triangle = $\frac{1}{2}ab\sin C$
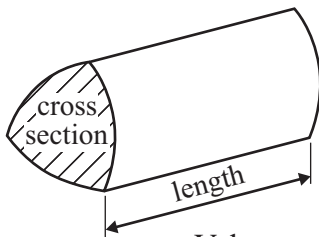
Volume of prism = area of cross section × length
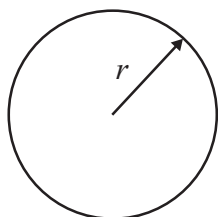
Circumference of circle = $2\pi r$

Area of circle = πr^2

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

Volume of cylinder = $\pi r^2 h$

Curved surface area
of cylinder = $2\pi rh$

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

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

P 4 1 0 3 6 A 0 2 2 0

Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Use your calculator to work out the value of

$$\frac{8.7 + 2.8}{1.4^2}$$

Give your answer as a decimal.
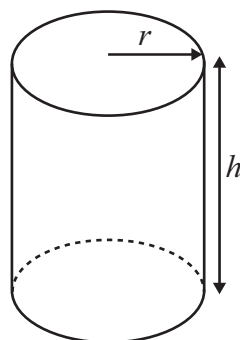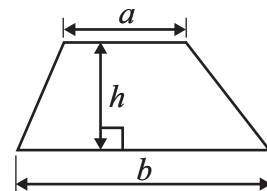Write down all the figures on your calculator display.

....

(2)

(b) Give your answer to part (a) correct to 2 significant figures.

....

(1)

(Total for Question 1 is 3 marks)

2 A circle has a diameter of 7.6 cm.
Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 2 is 2 marks)

Do NOT write in this space.

P 4 1 0 3 6 A 0 3 2 0

3 The table shows information about the marks of 20 students in a science test.

Mark	Frequency
6	2
7	4
8	5
9	8
10	1

Work out the mean mark of the 20 students.

....

(Total for Question 3 is 3 marks)

4 Abid is waiting for a bus.
The probability that his bus will be early is 0.2
The probability that his bus will be on time is 0.7

Work out the probability that his bus will be either early or on time.

....

(Total for Question 4 is 2 marks)

5 $\mathscr{E}$ = {even numbers}
A = {2, 4, 6, 8, 10}

(a) B is a set such that $A \cap B$ = {4, 8}
The set B has 3 members.

List the members of one possible set B.

....

(2)

(b) C is a set such that $A \cap C$ = Ø
The set C has 3 members.

List the members of one possible set C.

....

(1)

(Total for Question 5 is 3 marks)

6 $\dfrac{5}{9}$ of the students in a group are male.

$\dfrac{5}{6}$ of the **female** students in the group are right-handed.

(a) Work out the fraction of students in the group who are right-handed females.

....

(3)

(b) Find the smallest possible number of students in the group.

....

(2)

(Total for Question 6 is 5 marks)

Turn over ▶

7

16 cm

Diagram **NOT**
accurately drawn

10 cm

4 cm

9 cm
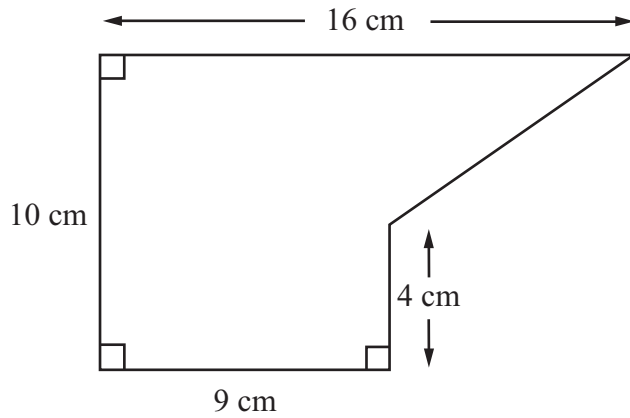
The diagram shows a shape.

Work out the area of the shape.

.... cm^2

(Total for Question 7 is 4 marks)

8 (a) Factorise $n^2 + 8n$

....

(2)

(b) Expand and simplify $3(2x - 5) - 4(x + 3)$

....

(2)

(c) Expand and simplify $(y + 7)(y + 2)$

....

(2)

(Total for Question 8 is 6 marks)

9

8.6 cm

x cm

6.9 cm
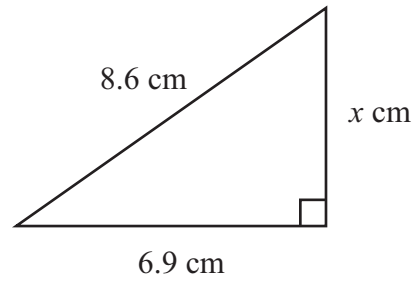
Diagram **NOT** accurately drawn

Work out the value of x.
Give your answer correct to 3 significant figures.

x =...............................

(Total for Question 9 is 3 marks)

10 Solve $3x + 16 = 1 - 2x$
Show clear algebraic working.

x =...............................
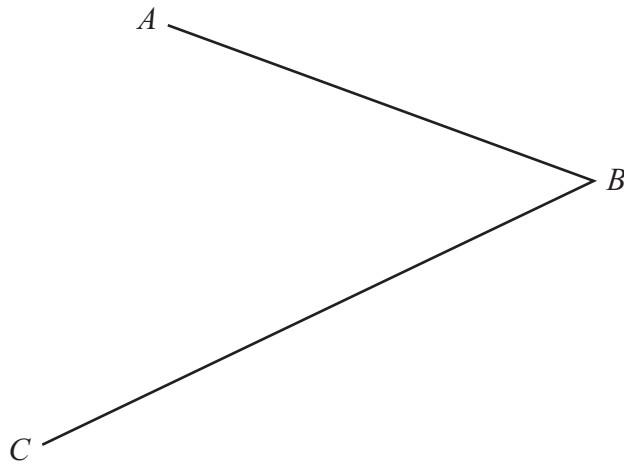
(Total for Question 10 is 3 marks)

11 Jack, Kate and Lila share some money in the ratios 5 : 9 : 6
In total, Jack and Kate receive £56

Work out the amount of money Lila receives.

£...............................

(Total for Question 11 is 3 marks)
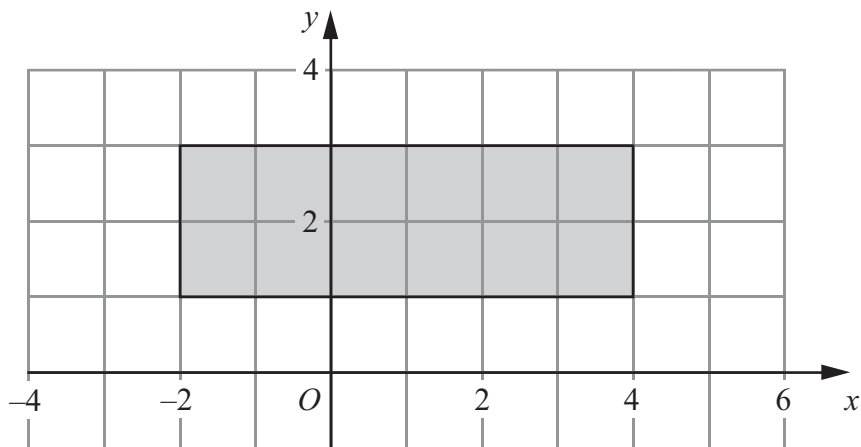
12 Use ruler and compasses to construct the bisector of angle *ABC*.
You must show all your construction lines.

A

B

C

(Total for Question 12 is 2 marks)

13

Write down inequalities to fully define the shaded region.

....

(Total for Question 13 is 3 marks)

14 Solve $\dfrac{2}{5x-2} = \dfrac{3}{6x+1}$

Show clear algebraic working.

$x = $ ....

(Total for Question 14 is 4 marks)

15 (a) Simplify $\dfrac{5x^5 y^6}{x^2 y^4}$

....

(2)

(b) Simplify $(2n^4)^3$

....

(2)

(Total for Question 15 is 4 marks)

16 The grouped frequency table gives information about the lengths of 160 pythons.

Length (x metres)	Frequency
$0 < x \leqslant 1$	4
$1 < x \leqslant 2$	8
$2 < x \leqslant 3$	16
$3 < x \leqslant 4$	32
$4 < x \leqslant 5$	72
$5 < x \leqslant 6$	28

(a) Complete the cumulative frequency table.

Length (x metres)	Cumulative frequency
$0 < x \leqslant 1$	
$0 < x \leqslant 2$	
$0 < x \leqslant 3$	
$0 < x \leqslant 4$	
$0 < x \leqslant 5$	
$0 < x \leqslant 6$	

(1)

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P 4 1 0 3 6 A 0 1 0 2 0

(b) On the grid, draw a cumulative frequency graph for your table.

Cumulative
frequency

160

120

80

40

O   1   2   3   4   5   6
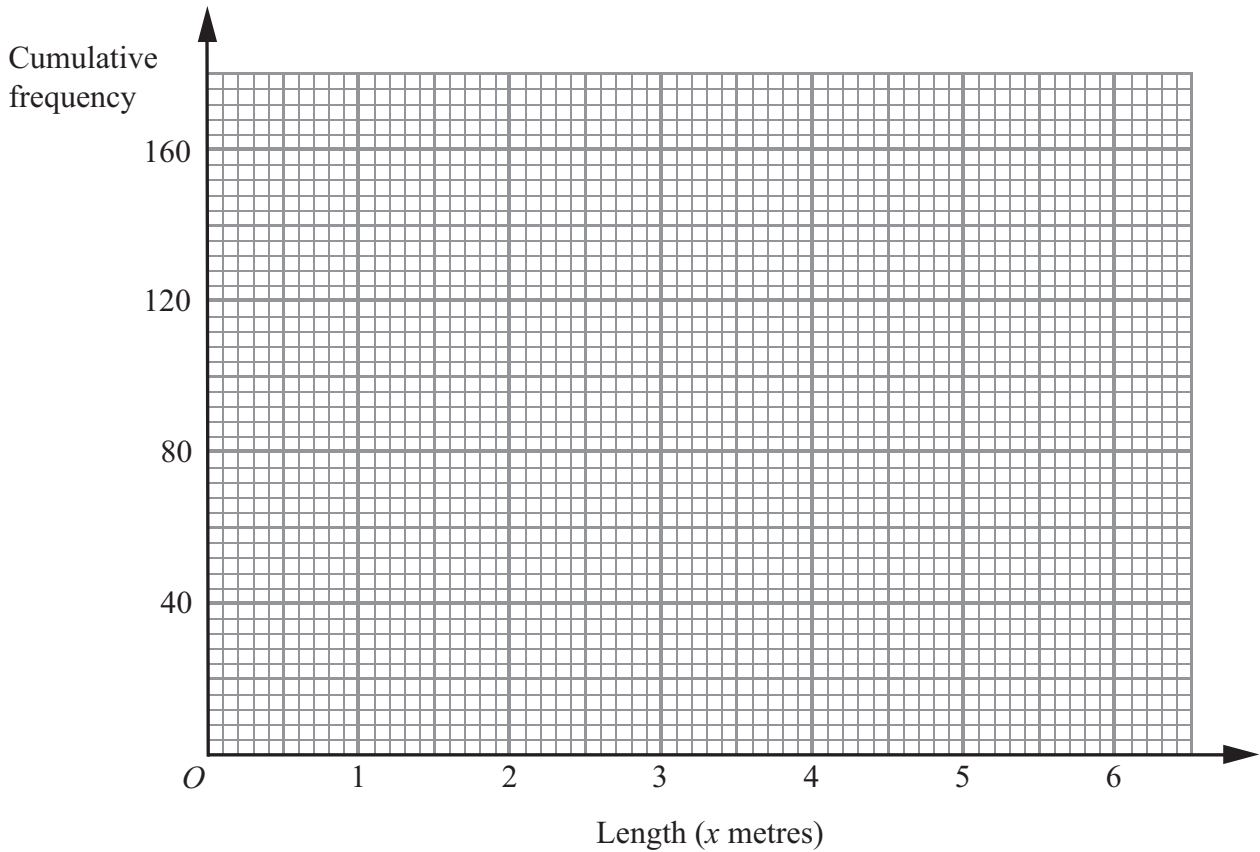
Length (x metres)

(2)

(c) Use your graph to find an estimate for the median length of the pythons.

.... metres

(2)

(Total for Question 16 is 5 marks)
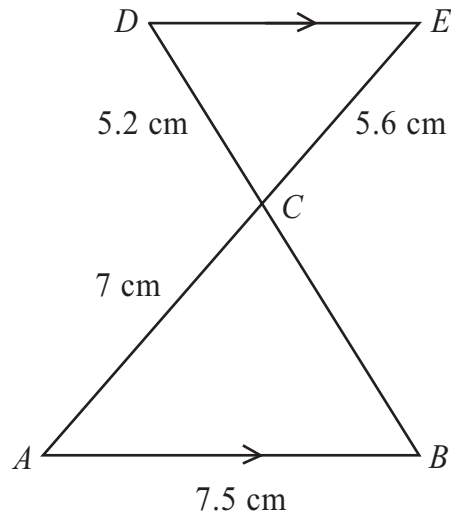
Do NOT write in this space.

17

Diagram **NOT**
accurately drawn

AB is parallel to *DE*.
The lines *AE* and *BD* intersect at *C*.
AB = 7.5 cm, *AC* = 7 cm, *CD* = 5.2 cm, *CE* = 5.6 cm.

(a) Calculate the length of *BC*.

.... cm
(2)

(b) Calculate the length of *DE*.

.... cm
(2)

(c) The area of triangle *ABC* is 21 cm^2
Calculate the area of triangle *EDC*.

.... cm^2
(3)

(Total for Question 17 is 7 marks)

18 Solve $5x^2 + 2x - 4 = 0$

Give your solutions correct to 3 significant figures.

Show your working clearly.

....

(Total for Question 18 is 3 marks)

19 $(3 + \sqrt{a})(4 + \sqrt{a}) = 17 + k\sqrt{a}$ where a and k are positive integers.

Find the value of a and the value of k.

$a =$ ....

$k =$ ....
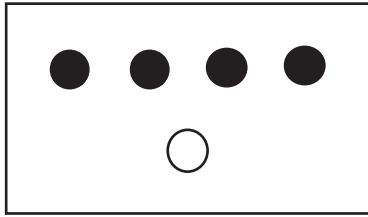
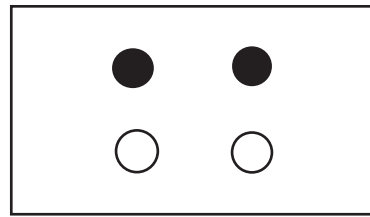**(Total for Question 19 is 3 marks)**

20

Box X   Box Y

In Box X, there are 4 black discs and 1 white disc.
In Box Y, there are 2 black discs and 2 white discs.

Vikram takes at random a disc from Box X and puts it in Box Y.
He then takes at random a disc from Box Y.

(a) Calculate the probability that the disc he takes from Box X and the disc he takes
from Box Y will both be black discs.

....
(2)

(b) Calculate the probability that the disc he takes from Box Y will be a white disc.

....
(3)

(Total for Question 20 is 5 marks)

21 When a photograph is taken, the exposure time, t, is directly proportional to the square of the size, f, of the opening in the camera lens.

$t = 0.02$ when $f = 8$

(a) Find a formula for t in terms of f.

....
(3)

(b) Calculate the value of f when $t = 0.0098$

$f = $ ....
(2)

(Total for Question 21 is 5 marks)
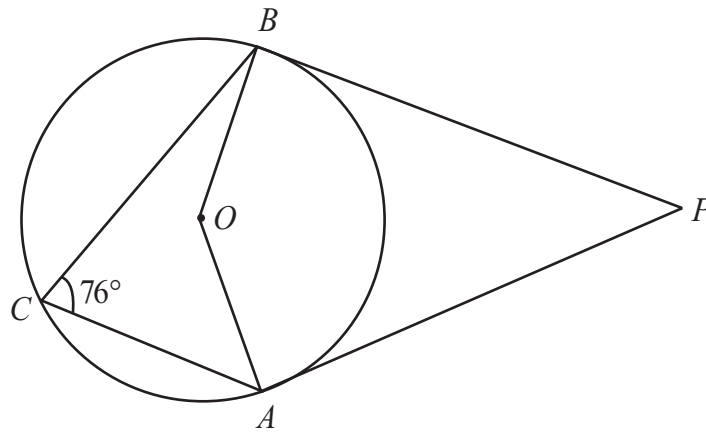
Do NOT write in this space.

22

Diagram **NOT** accurately drawn

A, B and *C* are points on a circle, centre *O*.
Angle *ACB* = 76°
PA and *PB* are tangents to the circle.

Calculate the size of angle *APB*.

.... °

(Total for Question 22 is 4 marks)

Do NOT write in this space.

23 f is a function such that

$$f(x) = \frac{1}{x^2 + 1}$$

(a) Find $f(\frac{1}{2})$

....
(1)

g is a function such that

$$g(x) = \sqrt{x-1} \quad x \geqslant 1$$

(b) Find fg(x)
Give your answer as simply as possible.

fg(x) = ...
(2)

(Total for Question 23 is 3 marks)

24 On Monday, Nalim made a journey.
On Tuesday, she made the same journey.
Her average speed on Tuesday was 25% greater than her average speed on Monday.
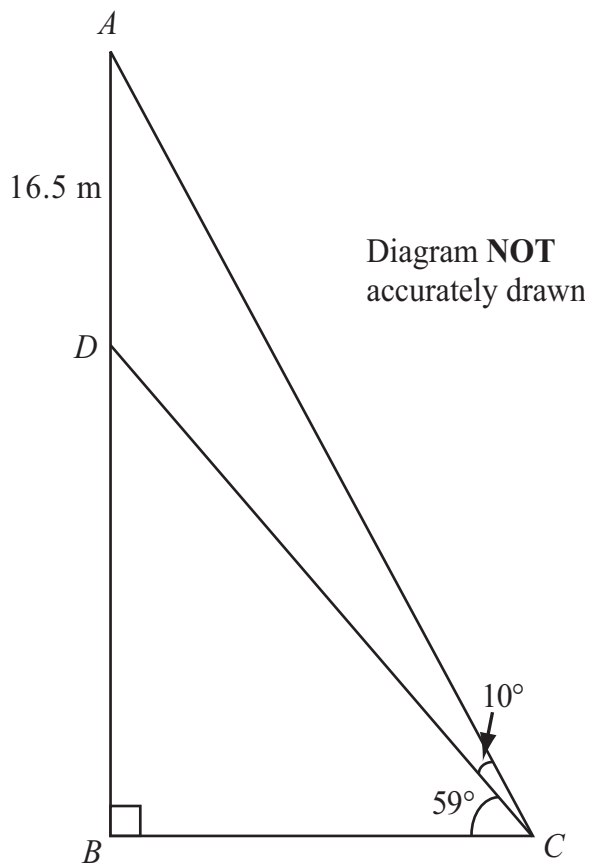
Calculate the percentage reduction in the time her journey took on Tuesday compared
with Monday.

.... %

(Total for Question 24 is 3 marks)

Turn over ▶

25

A

16.5 m

Diagram **NOT**
accurately drawn

D

10°

59°

B

C

The diagram shows a vertical flagpole in Chennai, India.
The point *A* is at the top of the flagpole.
The point *B* is at the foot of the flagpole.
There is a platform at the point *D* on the flagpole.
B and *C* are points on horizontal ground.
AD = 16.5 m
The angle of elevation of *A* from *C* is 69°
The angle of elevation of *D* from *C* is 59°

Calculate the height, *AB*, of the flagpole.
Give your answer correct to 3 significant figures.

.... m

(Total for Question 25 is 6 marks)

Turn over for Question 26.

26 Solve the simultaneous equations

$$y = 3x + 2$$

$$x^2 + y^2 = 20$$

Show clear algebraic working.

....

(Total for Question 26 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS