

Write your name here

Surname

Other names

**Pearson Edexcel Certificate**  
**Pearson Edexcel**  
**International GCSE**

Centre Number

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Candidate Number

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# Mathematics A

## Paper 3H



### Higher Tier

Friday 10 January 2014 – Morning

**Time: 2 hours**

Paper Reference

**4MA0/3H**  
**KMA0/3H**
**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.

Turn over ►

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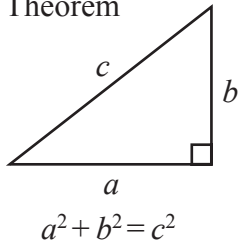
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**PEARSON**

**International GCSE MATHEMATICS  
FORMULAE SHEET – HIGHER TIER**

Pythagoras' Theorem

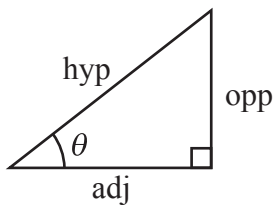
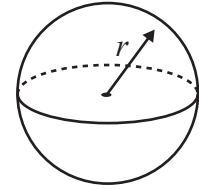
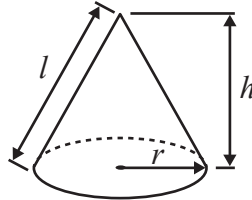


Volume of cone =  $\frac{1}{3} \pi r^2 h$

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

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

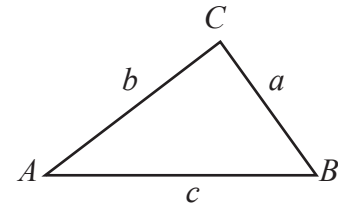
Surface area of sphere =  $4 \pi r^2$



adj = hyp  $\times$  cos  $\theta$   
opp = hyp  $\times$  sin  $\theta$   
opp = adj  $\times$  tan  $\theta$

In any triangle ABC

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

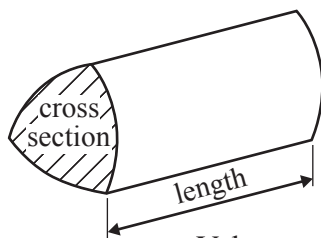


$\cos \theta = \frac{\text{adj}}{\text{hyp}}$

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

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

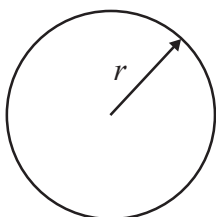
Cosine rule:  $a^2 = b^2 + c^2 - 2bc \cos A$



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

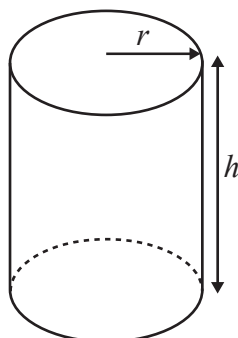
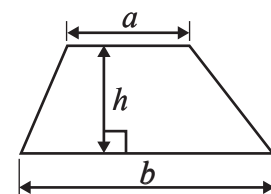
Volume of prism = area of cross section  $\times$  length

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



Circumference of circle =  $2 \pi r$

Area of circle =  $\pi r^2$



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

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

Curved surface area  
of cylinder =  $2 \pi r h$

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



**Answer ALL TWENTY ONE questions.**

**Write your answers in the spaces provided.**

**You must write down all stages in your working.**

- 1 Here is a list of the ingredients needed to make leek and potato soup for 6 people.

<b>Leek and Potato Soup</b>
Ingredients for 6 people
900 ml chicken stock
900 ml water
750 g leeks
350 g potatoes
350 g onions

- (a) Ainsley wants to make leek and potato soup for 13 people.

Work out the amount of chicken stock he needs.

..... ml  
(2)

- (b) Delia makes leek and potato soup for a group of people.  
She uses 1250 g of leeks.

Work out the number of people in the group.

.....  
(2)

**(Total for Question 1 is 4 marks)**

**Do NOT write in this space.**



- 2 A plane flew from Frankfurt to Hong Kong.  
The flight time was 10 hours 45 minutes.  
The average speed was 852 km/h.

Work out the distance the plane flew.

..... km

**(Total for Question 2 is 3 marks)**

3

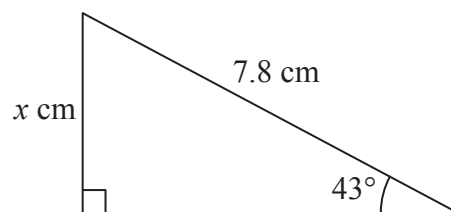


Diagram **NOT**  
accurately drawn

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

$x =$  .....

**(Total for Question 3 is 3 marks)**

**Do NOT write in this space.**



4 (a) Write  $2^3 \times 2^4$  as a single power of 2

.....  
(1)

(b)  $280 = 2^n \times 5 \times 7$

Find the value of  $n$ .

$n =$  .....  
(2)

**(Total for Question 4 is 3 marks)**

5 (a) Simplify  $5c \times 4c$

.....  
(1)

(b) Factorise  $4x + x^2$

.....  
(2)

(c) Work out the value of  $y^3 + 5y$  when  $y = 2$

.....  
(2)

**(Total for Question 5 is 5 marks)**



6

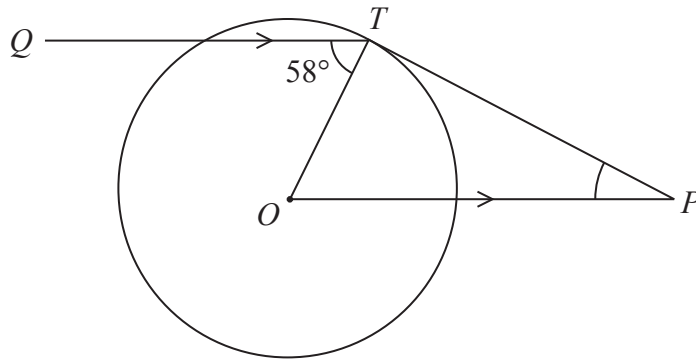


Diagram NOT  
accurately drawn

$T$  is a point on a circle, centre  $O$ .

$Q$  is a point such that angle  $QTO = 58^\circ$

$P$  is the point such that  $OP$  is parallel to  $QT$  and  $PT$  is a tangent to the circle.

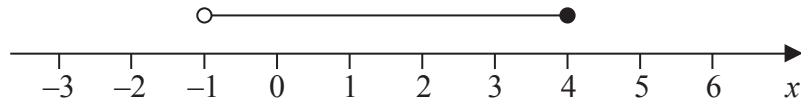
Work out the size of angle  $OPT$ .

(Total for Question 6 is 3 marks)

**Do NOT write in this space.**



7 (a)



An inequality is shown on the number line.

Write down this inequality.

.....  
(2)

(b) (i) Solve the inequality  $2(y - 3) \geq 1$

(ii) Write down the lowest **integer** which satisfies this inequality.

.....  
(4)

**(Total for Question 7 is 6 marks)**

**Do NOT write in this space.**



- 8 A box contains 80 tea bags.  
The table shows information about the weight of each tea bag.



Weight ( $w$ grams)	Number of tea bags
$2.8 < w \leq 2.9$	2
$2.9 < w \leq 3.0$	4
$3.0 < w \leq 3.1$	22
$3.1 < w \leq 3.2$	32
$3.2 < w \leq 3.3$	14
$3.3 < w \leq 3.4$	6

- (a) Work out the percentage of the 80 tea bags that weigh more than 3.1 grams.

..... %  
(2)

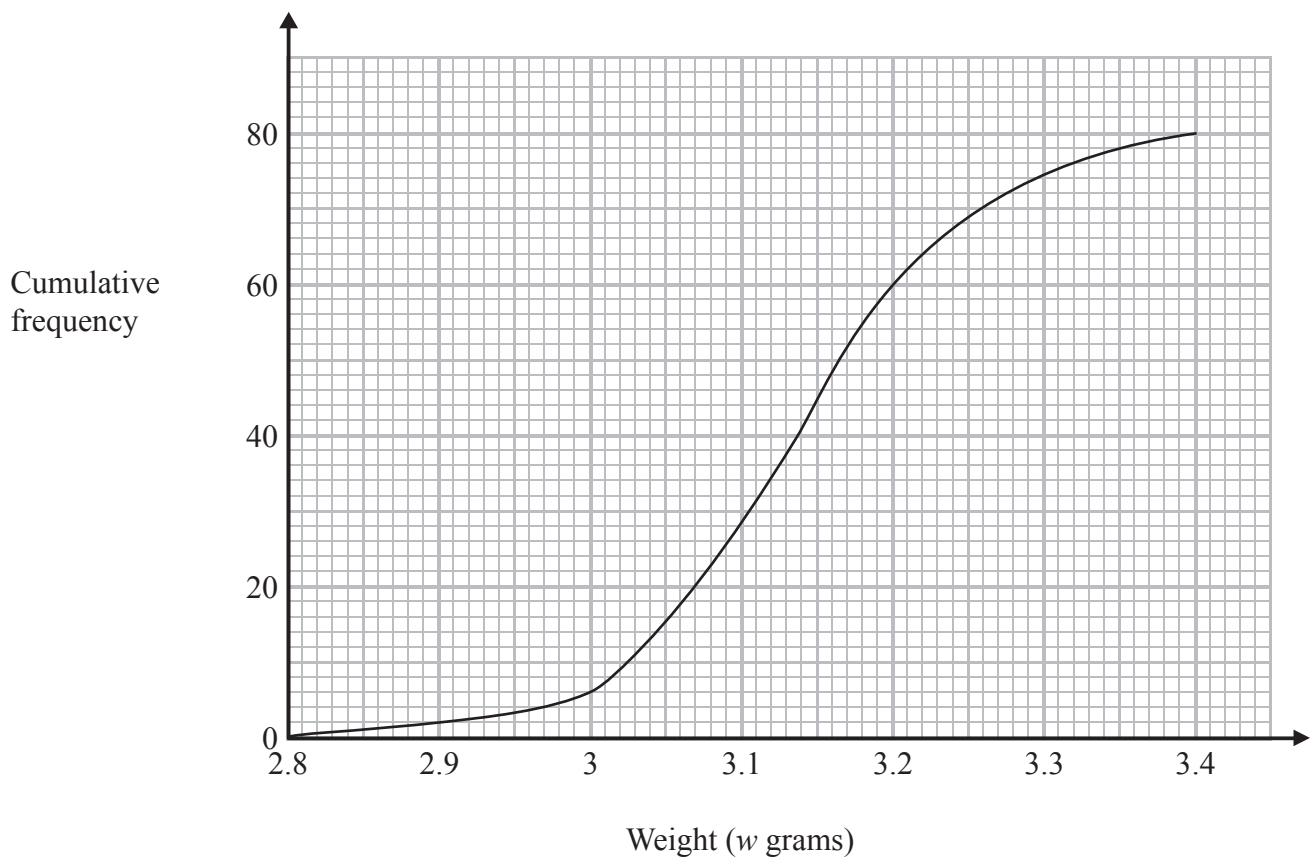
- (b) Work out an estimate for the total weight of the 80 tea bags.  
Use halfway values of 2.85 grams, 2.95 grams, ...

..... grams  
(3)





Here is a cumulative frequency graph for the weights of the 80 tea bags.



- (c) Use the graph to find an estimate for the number of tea bags which weighed more than 3.25 grams.

.....  
(2)

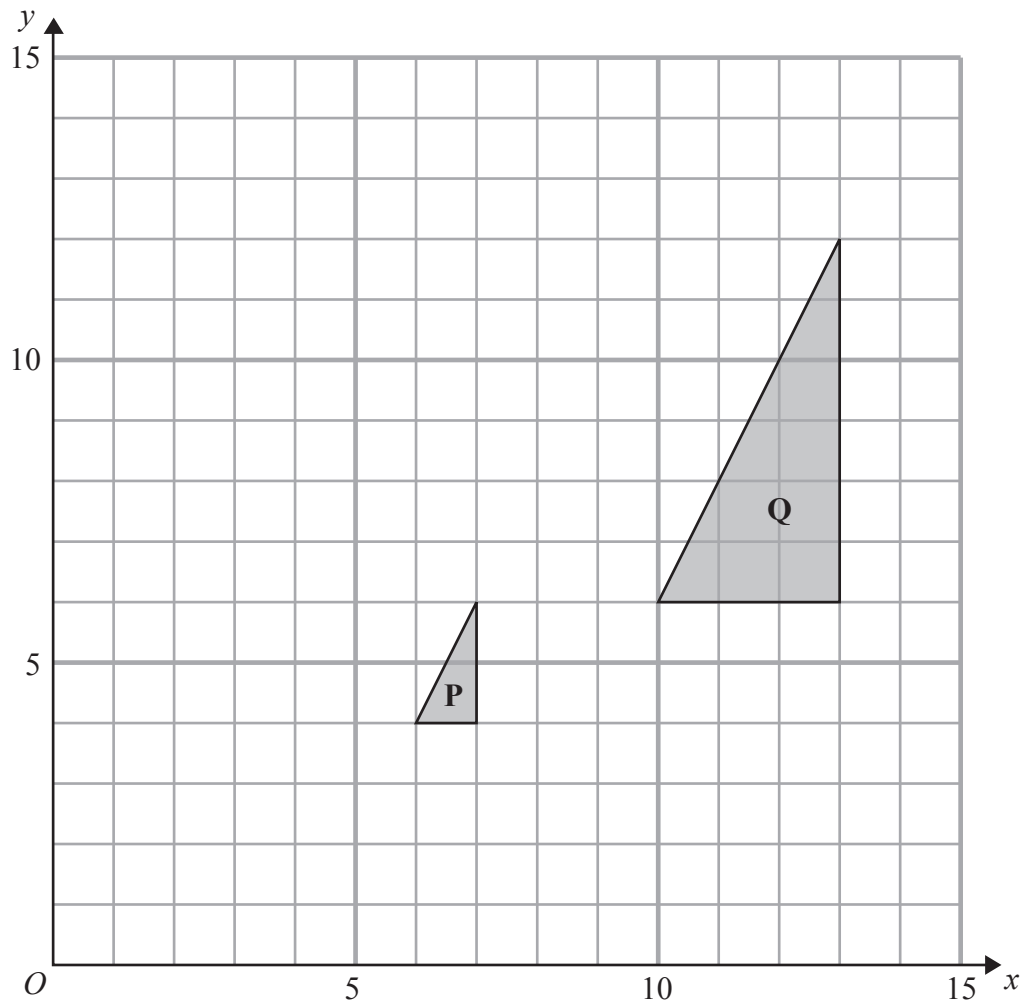
- (d) Use the graph to find an estimate for the interquartile range of the weights of the tea bags.

..... grams  
(2)

(Total for Question 8 is 9 marks)



9



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

(3)

(b) On the grid, translate triangle **Q** by the vector  $\begin{pmatrix} -8 \\ 2 \end{pmatrix}$

Label the new triangle **R**.

(1)

(c) Describe fully the single transformation which maps triangle **R** onto triangle **P**.

(2)

(Total for Question 9 is 6 marks)



- 10 Serena bought a car that had a value of \$16 000  
At the end of each year, the value of her car had depreciated by 15%.  
Calculate the value of her car at the end of 3 years.

\$.....

(Total for Question 10 is 3 marks)

11 Solve  $\frac{6x - 1}{4} - \frac{5 - 2x}{2} = 1$

Show clear algebraic working.

$x =$  .....

(Total for Question 11 is 4 marks)



12

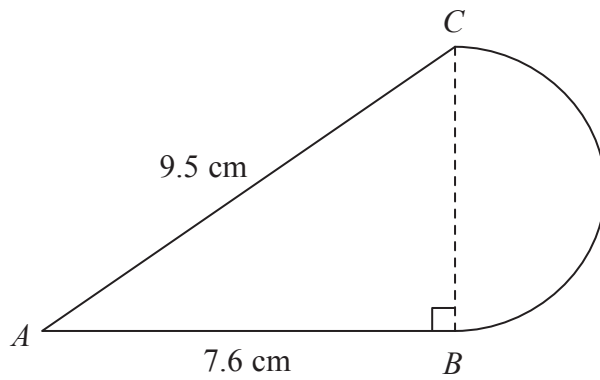


Diagram **NOT**  
accurately drawn

The diagram shows a shape made from triangle  $ABC$  and a semicircle with diameter  $BC$ .  
Triangle  $ABC$  is right-angled at  $B$ .  
 $AB = 7.6$  cm and  $AC = 9.5$  cm.

Calculate the area of the shape.  
Give your answer correct to 3 significant figures.

..... cm<sup>2</sup>

(Total for Question 12 is 5 marks)



- 13 A box contains 20 nails.  
The table shows information about the length of each nail.

<b>Length of nail (mm)</b>	25	30	40	50	60
<b>Number of nails</b>	1	8	4	5	2



- (a) Viraj takes at random one nail from the box.

Find the probability that the length of the nail he takes is

- (i) 50 mm or 60 mm,

.....

- (ii) less than 35 mm.

.....

(4)

- (b) Jamila puts all 20 nails into a bag.  
She takes at random one of the nails and records its length.  
She replaces the nail in the bag.  
She then takes at random a second nail from the bag and records its length.

Calculate the probability that the two nails she takes

- (i) each have a length of 60 mm,

.....

- (ii) have a total length of 80 mm.

.....

(5)

(Total for Question 13 is 9 marks)



14  $D$  is directly proportional to  $t^2$   
When  $t = 4$ ,  $D = 8$

(a) Find a formula for  $D$  in terms of  $t$ .

.....  
(3)

(b) Find the positive value of  $t$  when  $D = 50$

$t =$  .....  
(2)

(Total for Question 14 is 5 marks)

15

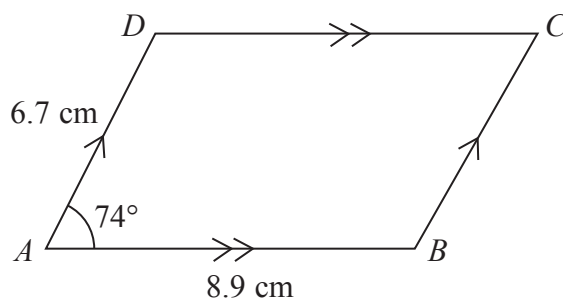


Diagram NOT  
accurately drawn

$ABCD$  is a parallelogram.

$AB = 8.9$  cm.

$AD = 6.7$  cm.

Angle  $BAD = 74^\circ$

Calculate the area of parallelogram  $ABCD$ .

Give your answer correct to 3 significant figures.

..... cm<sup>2</sup>

(Total for Question 15 is 3 marks)



16 Given that  $y$  is positive, make  $y$  the subject of  $y = \sqrt{ay^2 + n}$

Show clear algebraic working.

$$y = \dots\dots\dots$$

**(Total for Question 16 is 5 marks)**

17 Given that  $(5 - \sqrt{x})^2 = y - 20\sqrt{2}$  where  $x$  and  $y$  are positive integers, find the value of  $x$  and the value of  $y$ .

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

**(Total for Question 17 is 3 marks)**



18 (a)  $x = 9 \times 10^{2m}$  where  $m$  is an integer.

Find, in standard form, an expression for  $\sqrt{x}$

.....  
(2)

(b)  $y = 9 \times 10^{2n}$  where  $n$  is an integer.

Find, in standard form, an expression for  $y^{\frac{3}{2}}$

Give your answer as simply as possible.

.....  
(3)

(Total for Question 18 is 5 marks)

19 Factorise completely  $(12x - y)^2 - (4x - 3y)^2$

.....  
(Total for Question 19 is 2 marks)





20  $f$  is the function  $f(x) = 2x + 5$

(a) Find  $f(3)$

.....  
(1)

(b) Express the inverse function  $f^{-1}$  in the form  $f^{-1}(x) =$

$f^{-1}(x) =$ .....  
(2)

$g$  is the function  $g(x) = x^2 - 25$

(c) Find  $g(-3)$

.....  
(1)

(d) (i) Find  $gf(x)$   
Give your answer as simply as possible.

$gf(x) =$ .....

(ii) Solve  $gf(x) = 0$

.....  
(5)

(Total for Question 20 is 9 marks)



21

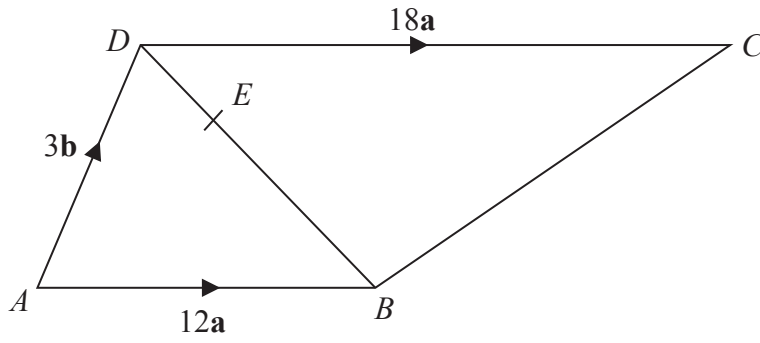


Diagram NOT accurately drawn

$ABCD$  is a trapezium.  
 $AB$  is parallel to  $DC$ .

$$\vec{AB} = 12\mathbf{a}$$

$$\vec{AD} = 3\mathbf{b}$$

$$\vec{DC} = 18\mathbf{a}$$

$E$  is the point on the diagonal  $DB$  such that  $DE = \frac{1}{3}DB$ .

(a) Find, in terms of  $\mathbf{a}$  and  $\mathbf{b}$ ,

(i)  $\vec{DB}$

(ii)  $\vec{DE}$

(iii)  $\vec{AE}$

.....

.....

.....

(3)



(b) Show by a vector method that  $BC$  is parallel to  $AE$ .

(2)

(Total for Question 21 is 5 marks)

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**TOTAL FOR PAPER IS 100 MARKS**

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