Write your name here

| Surname | Other names |
|---|---|
| | |

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

Centre Number | Candidate Number

# Mathematics A

## Paper 4HR



**Higher Tier**

Tuesday 20 May 2014 – Afternoon
**Time: 2 hours**

Paper Reference
**4MA0/4HR**

**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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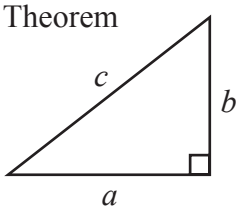
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PEARSON

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

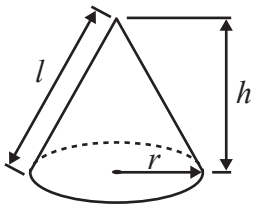
Pythagoras' Theorem




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

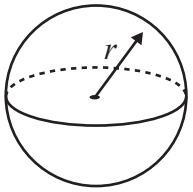
Volume of cone = $\frac{1}{3}\pi r^2 h$

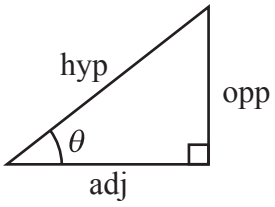
Curved surface area of cone = $\pi r l$




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

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



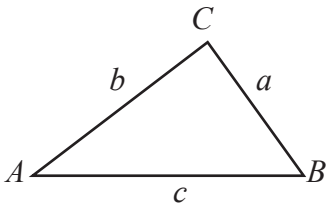

adj = hyp × cos $\theta$
opp = hyp × sin $\theta$
opp = adj × tan $\theta$

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

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

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

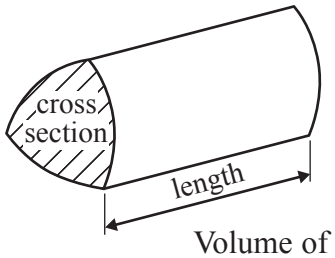
In any triangle $ABC$



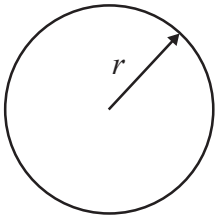

Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



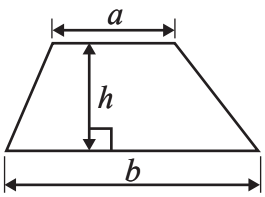

Volume of prism = area of cross section × length

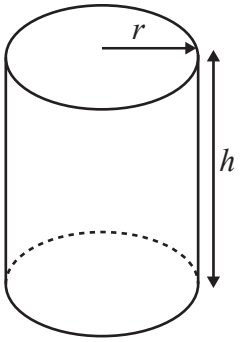



Circumference of circle = $2\pi r$

Area of circle = $\pi r^2$

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

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

**Answer ALL TWENTY ONE questions.**

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

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

**1** $f = 5p - 4v$

Work out the value of $p$ when $f = -22$ and $v = -5$

$p =$ .....

**(Total for Question 1 is 3 marks)**

**2** Here is part of a timetable for the Paris to Montpellier express train service.

| | | | | | |
|---|---|---|---|---|---|
| **Paris** | 06 07 | 10 07 | 12 07 | 18 07 | 20 07 |
| **Valence** | 08 22 | 12 24 | 14 24 | 20 24 | 22 24 |
| **Nimes** | 09 09 | 13 05 | 15 05 | 21 05 | 23 05 |
| **Montpellier** | 09 37 | 13 34 | 15 34 | 21 34 | 23 34 |

The average speed of the 20 07 train from Paris is 224 km/h.

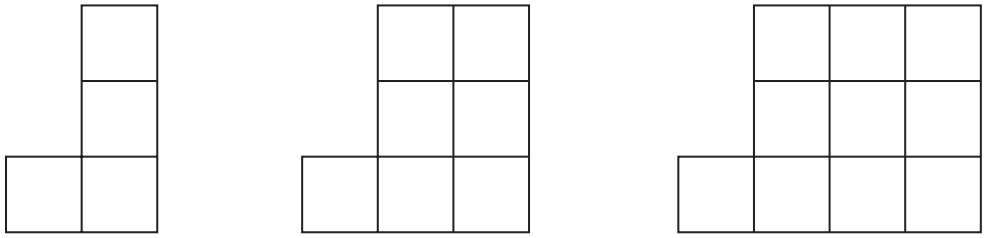
Work out the distance this train travels from Paris to Montpellier.

..... km

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

**Do NOT write in this space.**

**3** Here is a sequence of patterns made from centimetre squares.



Pattern number 1 | Pattern number 2 | Pattern number 3

(a) Find an expression, in terms of $n$, for the total number of centimetre squares in Pattern number $n$.

.....

**(2)**

A pattern in this sequence has 88 centimetre squares.

(b) Work out the Pattern number of this pattern.

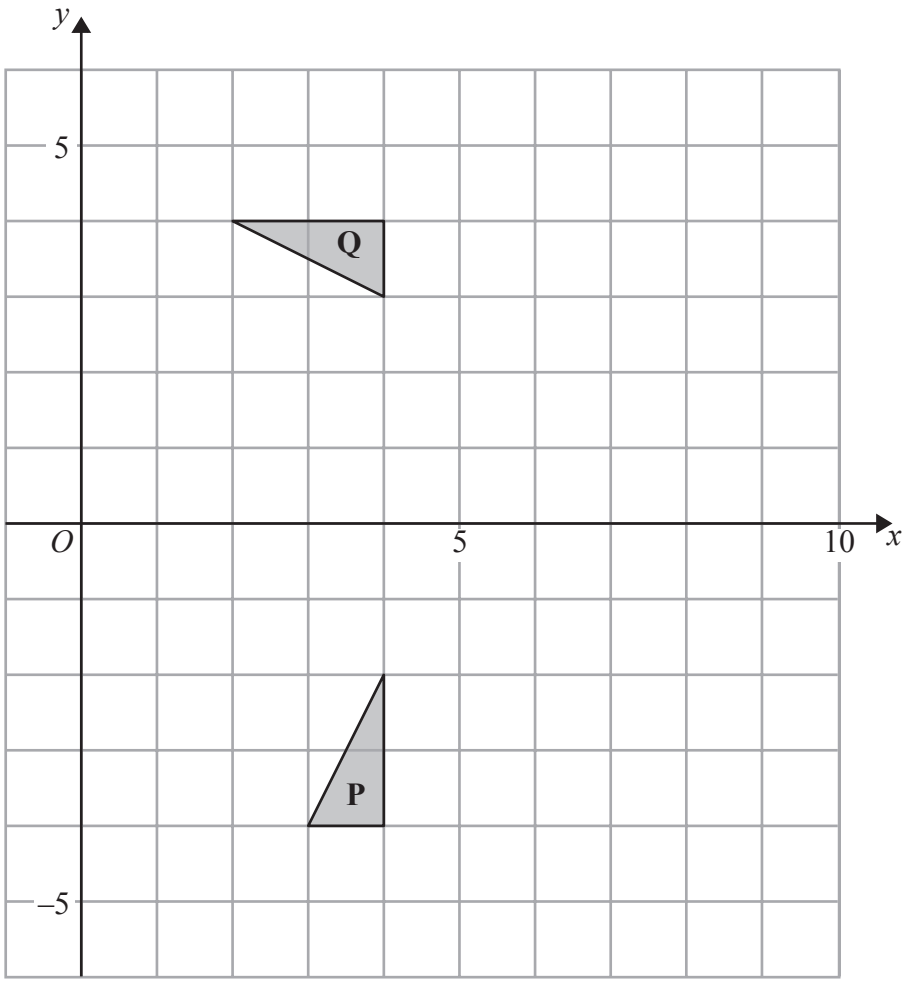
.....

**(2)**

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

**Do NOT write in this space.**

**4**




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

.....

.....

**(3)**

(b) On the grid, translate triangle **P** 3 squares to the right and 5 squares up.
Label the new triangle **R**.

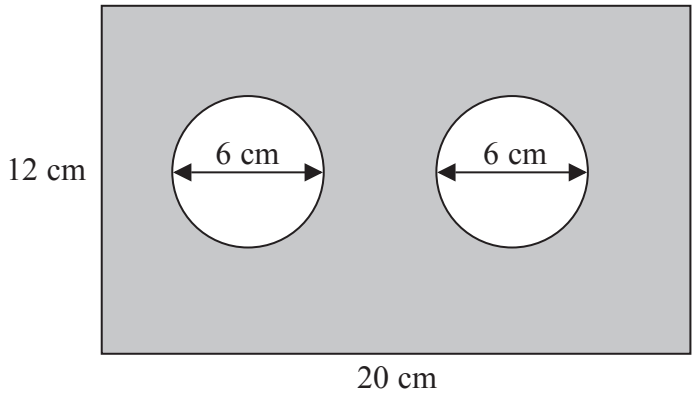
**(1)**

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

**Do NOT write in this space.**

**5**

Diagram **NOT** accurately drawn




The diagram shows a metal plate in the shape of a rectangle.
The rectangle has length 20 cm and width 12 cm.
Two identical circles, each of diameter 6 cm, have been cut out of the plate.

Work out the area of the shaded region of the metal plate.
Give your answer correct to the nearest $cm^2$.

..... $cm^2$

**(Total for Question 5 is 4 marks)**

**Do NOT write in this space.**

**6** Kim bought 12 boxes of drinks.
He paid \$15 for each box.
There were 12 drinks in each box.

Kim sold $\frac{3}{4}$ of the drinks for \$1.50 each.

He sold all of the other drinks at a reduced price.

He made an overall profit of 15%.

Work out how much Kim sold each reduced price drink for.

\$ .....

**(Total for Question 6 is 5 marks)**

**7** Reeta has a biased dice.

Each time Reeta rolls the dice, the probability that she will get a six is 0.1

(a) Write down the probability that she will not get a six.

.....

**(1)**

Reeta rolls the dice 50 times.

(b) Work out an estimate for the number of times that she will get a six.

.....

**(2)**

**(Total for Question 7 is 3 marks)**

---

**8** (a) Write 252 as a product of its prime factors.

.....

**(2)**

Given that $240 = 2^4 \times 3 \times 5$

and that $y = 240 \times 252$

(b) write $y$ as a product of powers of its prime factors.

.....

**(2)**

**(Total for Question 8 is 4 marks)**

**9** The diagram shows a parallelogram *ABCD*.
In the diagram, all the angles are in degrees.

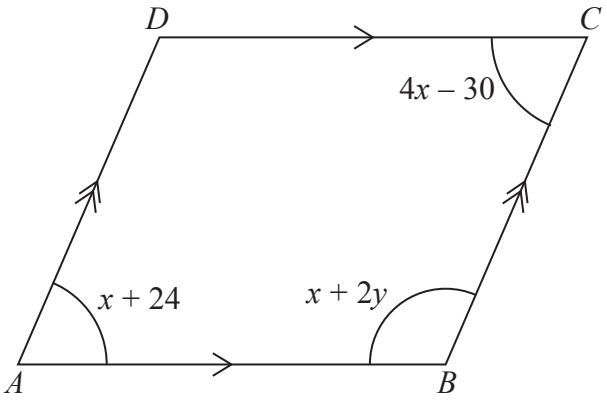



Diagram **NOT** accurately drawn

Work out the value of $x$ and the value of $y$.

$x =$ .....

$y =$ .....

**(Total for Question 9 is 4 marks)**

**Do NOT write in this space.**

**10** Mortar mix is made by mixing cement, sand and quicklime in the ratio 1 : 2 : 3

(a) Work out the volume of sand needed to make 2.1 $m^3$ of mortar mix.

..... $m^3$

**(2)**

Julie has 0.75 $m^3$ of quicklime.

She has plenty of sand and cement.

(b) Work out the greatest volume of mortar mix she could make.

..... $m^3$

**(2)**

**(Total for Question 10 is 4 marks)**

**Do NOT write in this space.**

**11** $a$, $b$, $c$ and $d$ are four integers.
Their mean is 8
Their mode is 7

Their median is 7.5

(a) Find the value of the largest of the four integers.

.....

**(2)**

(b) Find the mean value of the numbers $(2a - 3)$, $(2b - 3)$, $(2c - 3)$ and $(2d - 3)$.

.....

**(2)**

**(Total for Question 11 is 4 marks)**

**Do NOT write in this space.**

**12** (a) Factorise $2t^2 - 7t + 3$

.....

**(2)**

(b) Rearrange the formula $y = a - bx^2$ to make $x$ the subject.

$x =$ .....

**(3)**

**(Total for Question 12 is 5 marks)**

**Do NOT write in this space.**

**13** Here are the points that Carmelo scored in his last 11 basketball games.

23 20 14 23 17 24 24 18 16 22 21

(a) Find the interquartile range of these points.

.....

**(3)**

Kobe also plays basketball.
The median number of points Kobe has scored in his games is 18.5
The interquartile range of these points is 10

(b) Which of Carmelo or Kobe is the more consistent points scorer?
Give a reason for your answer.

.....

.....

**(1)**

**(Total for Question 13 is 4 marks)**

**Do NOT write in this space.**

**14** Rob is making a scale model of the Solar System on the school field.
He wants the distance from the Sun to Jupiter to be 8 metres on his scale model.

The real distance from the Sun to Jupiter is $7.8 \times 10^8$ kilometres.

(a) Find the scale of the model.
Give your answer in the form 1: $n$, where $n$ is written in standard form.

1: .....

**(3)**

Rob wants to put the position of a space probe on the scale model.
The real distance of the space probe from the Sun is $1.9 \times 10^{10}$ kilometres, correct to 2 significant figures.

(b) Work out the maximum distance of the space probe from the Sun on the scale model.
Give your answer in metres.

..... m

**(3)**

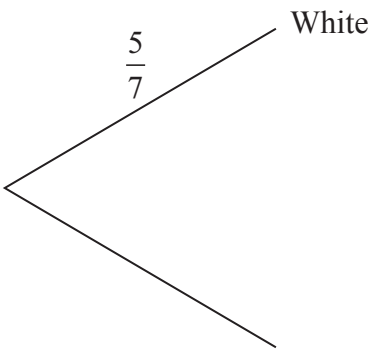
**(Total for Question 14 is 6 marks)**

**Do NOT write in this space.**

**15** Maria has two bags.
In bag A, there are 5 white counters and 2 red counters.
In bag B, there are 3 white counters and 2 red counters.

Maria is going to take at random one counter from bag A and one counter from bag B.

(a) Complete the probability tree diagram.




**(2)**

(b) Work out the probability that both counters will be white.

**(2)**

(c) Work out the probability that exactly one of the counters will be white.

**(3)**

**(Total for Question 15 is 7 marks)**

**16** Here is a hexagon.

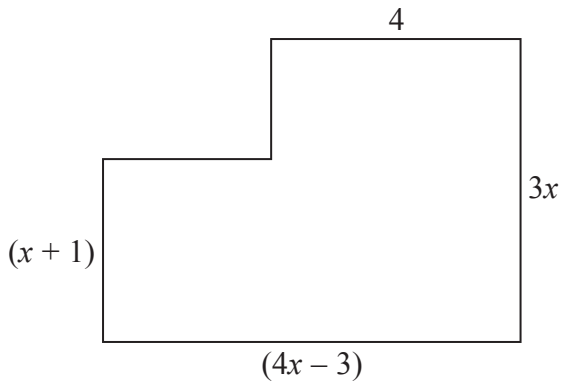



Diagram **NOT** accurately drawn

In the diagram, all the measurements are in centimetres.
All the corners are right angles.

The area of the hexagon is 40 cm$^2$

(a) Show that $4x^2 + 9x - 47 = 0$

**(3)**

(b) Solve $4x^2 + 9x - 47 = 0$

Show your working clearly.
Give your solutions correct to 3 significant figures.

.....

**(3)**

(c) Find the length of the longest side of the hexagon.
Give your answer correct to 3 significant figures.

..... cm

**(2)**

**(Total for Question 16 is 8 marks)**

**17** (a) Simplify $(16x^4y^2)^{\frac{1}{2}}$

.....

**(2)**

(b) Simplify fully $\dfrac{2x^2 - 8}{4x^2 - 8x}$

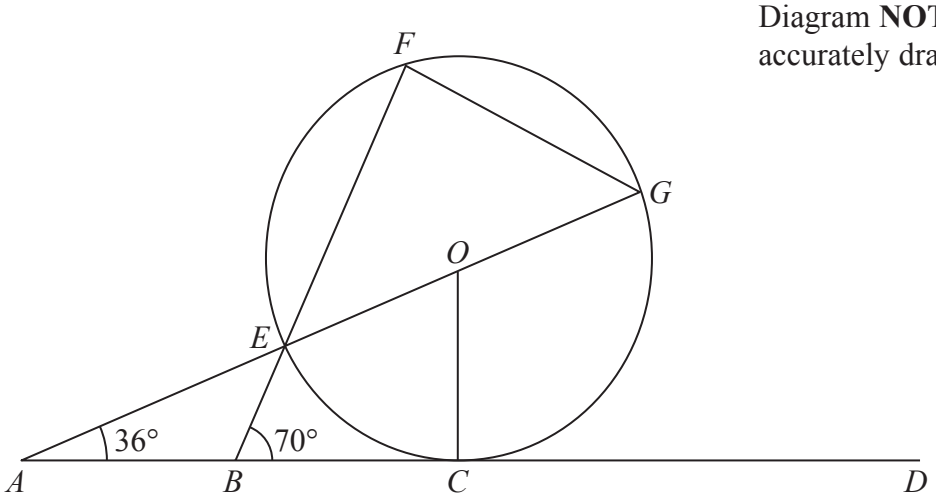
.....

**(3)**

**(Total for Question 17 is 5 marks)**

**18**

Diagram **NOT** accurately drawn




*ABCD* is the tangent at *C* to a circle, centre *O*.
*E*, *F* and *G* are points on the circle.
*AEOG* and *BEF* are straight lines.

Angle *BAE* = 36°
Angle *EBC* = 70°

(a) (i) Find the size of angle *AOC*.

.....°

(ii) Give reasons for your answer.

.....

.....

**(2)**

(b) Find the size of angle *CGF*.

.....°

**(3)**

**(Total for Question 18 is 5 marks)**

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**19**

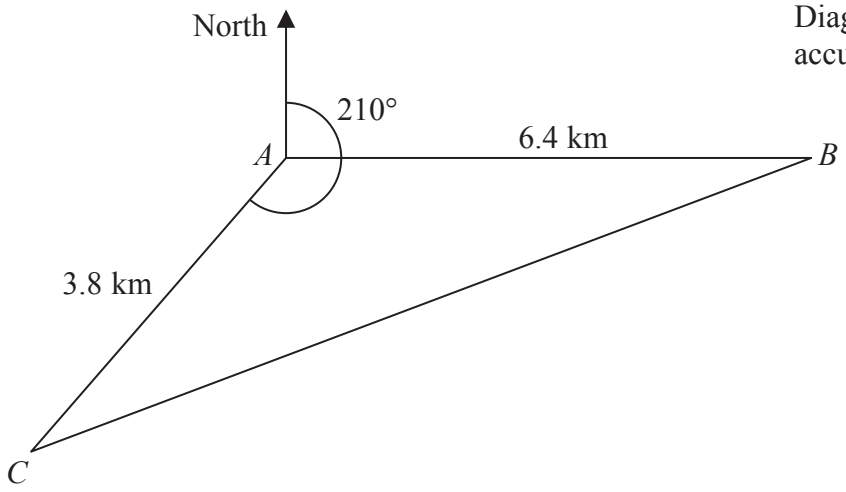



Diagram **NOT** accurately drawn

*A*, *B* and *C* are 3 villages.
*B* is 6.4 km due east of *A*.
*C* is 3.8 km from *A* on a bearing of 210°

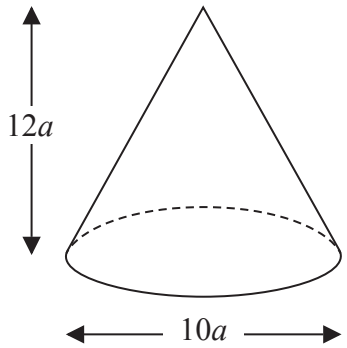
Calculate the bearing of *B* from *C*.
Give your answer correct to the nearest degree.
Show your working clearly.

.....°

**(Total for Question 19 is 6 marks)**

**20** The diagram shows a solid cone.

Diagram **NOT** accurately drawn




The diameter of the base of the cone is $10a$ cm.
The height of the cone is $12a$ cm.

The total surface area of the cone is $360\pi$ cm$^2$
The volume of the cone is $k\pi$ cm$^3$, where $k$ is an integer.

Find the value of $k$.

$k =$ .....

**(Total for Question 20 is 6 marks)**

**21** (a) Show that

$$(a^2 + 1)(c^2 + 1) = (ac - 1)^2 + (a + c)^2$$

**(3)**

(b) By finding suitable values of $a$ and $c$, use part (a) to write 650065 as the sum of two square numbers.

650065 = ..... + .....

**(3)**

**(Total for Question 21 is 6 marks)**

**TOTAL FOR PAPER IS 100 MARKS**

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