

Write your name here

Surname

Other names

**Pearson Edexcel  
International GCSE**

Centre Number

--	--	--	--	--	--

Candidate Number

--	--	--	--	--

# Mathematics A

## Paper 4HR



**Higher Tier**

Monday 12 January 2015 – 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 ►

P44620A

©2015 Pearson Education Ltd.

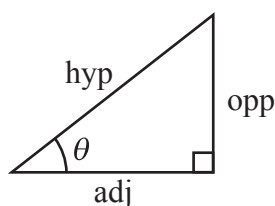
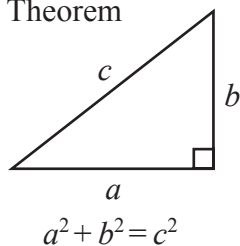
5/5/11



**PEARSON**

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

Pythagoras' Theorem

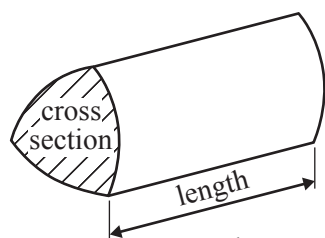


$$\begin{aligned} \text{adj} &= \text{hyp} \times \cos \theta \\ \text{opp} &= \text{hyp} \times \sin \theta \\ \text{opp} &= \text{adj} \times \tan \theta \end{aligned}$$

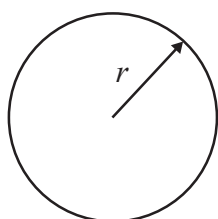
$$\text{or } \sin \theta = \frac{\text{opp}}{\text{hyp}}$$

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

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

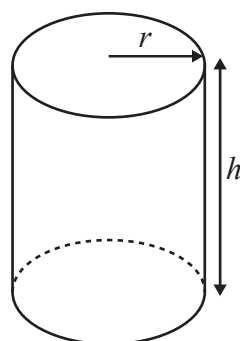


Volume of prism = area of cross section  $\times$  length



Circumference of circle =  $2\pi r$

Area of circle =  $\pi r^2$

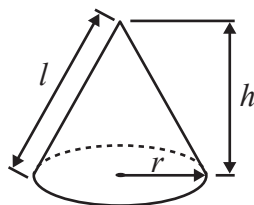


Volume of cylinder =  $\pi r^2 h$

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

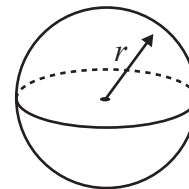
Volume of cone =  $\frac{1}{3} \pi r^2 h$

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

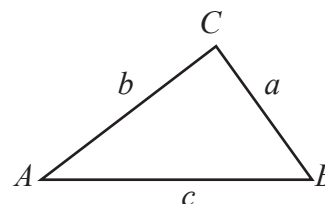


Volume of sphere =  $\frac{4}{3} \pi r^3$

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



In any triangle ABC

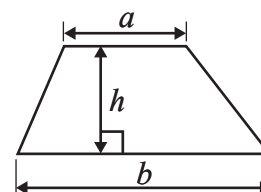


Sine rule:  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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

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



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 questions.**

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

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

**1** Eric travels from the UK to India every year.

In 2010, the exchange rate was £1 = 67.1 rupees.

In 2012, the exchange rate was £1 = 82.5 rupees.

In 2010 Eric changed £600 into rupees.

How many pounds (£) did Eric have to change to rupees in 2012 to get the same number of rupees as he did in 2010?

£ .....

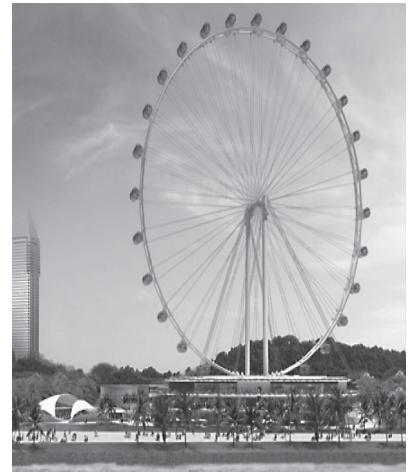
**(Total for Question 1 is 3 marks)**

**Do NOT write in this space.**



2 The wheel of the Singapore Flyer is a circle with a diameter of 150 metres.

- (a) Calculate the circumference of the wheel.  
Give your answer correct to the nearest metre.



..... metres  
(2)

The wheel takes 30 minutes to rotate once.

- (b) Work out the average speed of a point on the circumference of the wheel as it rotates once.  
Give your answer in metres per second correct to 3 significant figures.

..... metres per second  
(3)



The diagram shows a giant wheel above horizontal ground.

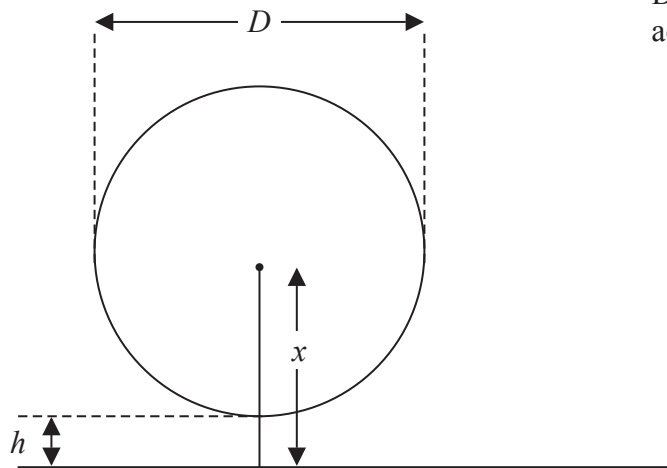


Diagram NOT  
accurately drawn

The wheel is a circle of diameter  $D$  metres.

The lowest point of the wheel is  $h$  metres above the ground.

The centre of the wheel is  $x$  metres above the ground.

(c) Express  $h$  in terms of  $D$  and  $x$

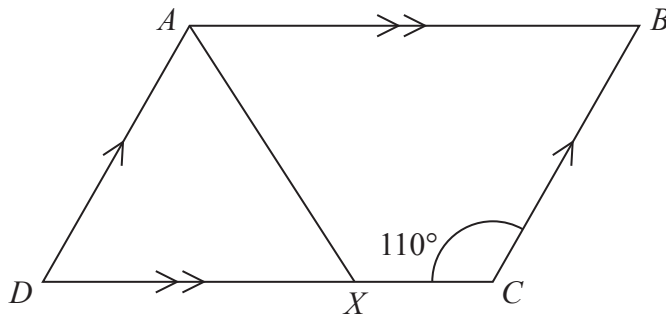
.....  
(2)

(Total for Question 2 is 7 marks)

Do NOT write in this space.



3

Diagram NOT  
accurately drawn

$ABCD$  is a parallelogram.

Angle  $DCB = 110^\circ$

$X$  is the point on  $DC$  such that  $AX$  bisects the angle  $DAB$ .

Calculate the size of angle  $AXC$ .

o

(Total for Question 3 is 4 marks)

Do NOT write in this space.

6



4 Solve  $x + 2y = 3$   
 $x - y = 6$

Show clear algebraic working.

$x = \dots\dots\dots$

$y = \dots\dots\dots$

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

**Do NOT write in this space.**



5 Here are some rows of a number pattern.

Row number	Column 1	Column 2	Column 3
1	$1 \times 3 + 1$	4	$2^2$
2	$2 \times 4 + 1$	9	$3^2$
3	$3 \times 5 + 1$	16	$4^2$
⋮			
		676	
⋮			
$n$			

(a) Write down the Row number of the row that has 676 in Column 2

.....  
(1)

(b) For Row number  $n$ ,

(i) write down an expression, in terms of  $n$ , that should go in Column 1

.....  
(ii) write down an expression, in terms of  $n$ , that should go in Column 3

.....  
(2)

(Total for Question 5 is 3 marks)





- 6 The table gives information about the number of vehicles passing a point on a road in each of 70 intervals of equal length.

Number of vehicles	Frequency
1 to 5	8
6 to 10	10
11 to 15	18
16 to 20	20
21 to 25	10
26 to 30	4

- (a) Write down the modal class interval.

.....  
(1)

- (b) Calculate an estimate for the mean.

.....  
(4)

(Total for Question 6 is 5 marks)

Do NOT write in this space.



7 Here is a trapezium  $ABCD$ .

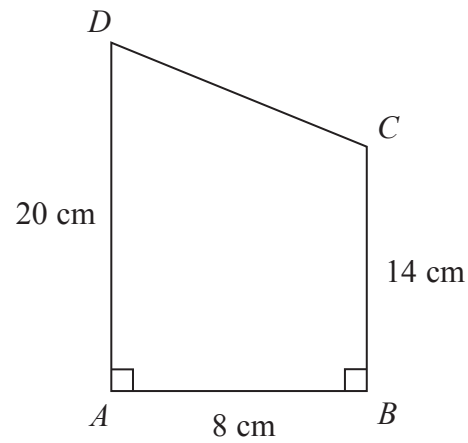


Diagram **NOT**  
accurately drawn

Angle  $DAB = \text{angle } ABC = 90^\circ$

$AD = 20 \text{ cm}$

$AB = 8 \text{ cm}$

$BC = 14 \text{ cm}$

(a) Calculate the area of the trapezium  $ABCD$ .

.....  $\text{cm}^2$   
(2)

(b) Calculate the length of  $CD$ .

.....  $\text{cm}$   
(4)

(Total for Question 7 is 6 marks)



8 (a) Write 224 as a product of powers of its prime factors.  
Show your working clearly.

.....  
(3)

(b) Write down 3 **different** factors of 224 with a sum between 99 and 110

.....  
(2)

.....  
**(Total for Question 8 is 5 marks)**

**Do NOT write in this space.**



9  $\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$A = \{\text{even numbers}\}$

$B = \{\text{multiples of 3}\}$

(a) List the members of set  $B$ .

.....  
(1)

(b) Find  $A \cup B$

.....  
(1)

(c) Find  $A \cap B$

.....  
(1)

$x$  is a member of  $\mathcal{E}$

$x \in B$

$x \notin A$

(d) What are the possible values of  $x$ ?

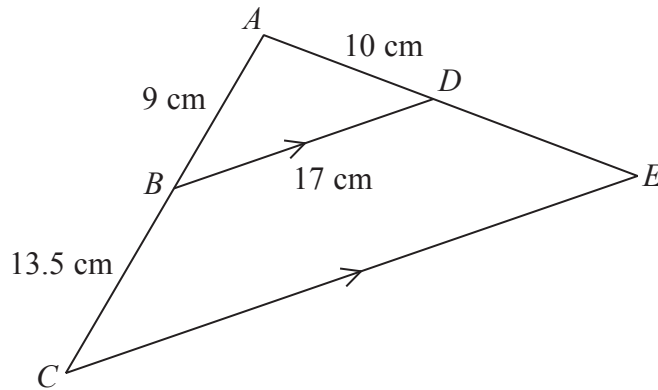
.....  
(2)

(Total for Question 9 is 5 marks)

Do NOT write in this space.



10

Diagram NOT  
accurately drawn

In the diagram  $ABC$  and  $ADE$  are straight lines.  
 $BD$  is parallel to  $CE$ .

$AB = 9$  cm,  $BC = 13.5$  cm,  $AD = 10$  cm,  $BD = 17$  cm

(a) Calculate the length of  $CE$ .

..... cm  
 (2)

(b) Calculate the length of  $DE$ .

..... cm  
 (2)

The area of triangle  $ABD$  is  $36$  cm<sup>2</sup>

(c) Calculate the area of quadrilateral  $BDEC$ .

..... cm<sup>2</sup>  
 (3)

(Total for Question 10 is 7 marks)



11  $t^n = \frac{1}{t^3}$

(a) Write down the value of  $n$ .

$$n = \dots\dots\dots (1)$$

(b) Simplify  $\frac{6xy^5}{3xy^2}$

$$\dots\dots\dots (2)$$

(c) Expand and simplify  $(3x - 2y)(x + 2y)$

$$\dots\dots\dots (2)$$

(d) Factorise  $4x^2 - 7x - 2$

$$\dots\dots\dots (2)$$

(Total for Question 11 is 7 marks)

Do NOT write in this space.



12  $I = kT^4$

$$k = 5.67 \times 10^{-8}$$

$$T = 5800$$

- (a) Work out the value of  $I$ .  
Give your answer in standard form correct to 3 significant figures.

$$I = \dots\dots\dots (2)$$

- (b) Rearrange the formula  $I = kT^4$  to make  $T$  the subject.

$$\dots\dots\dots (2)$$

(Total for Question 12 is 4 marks)

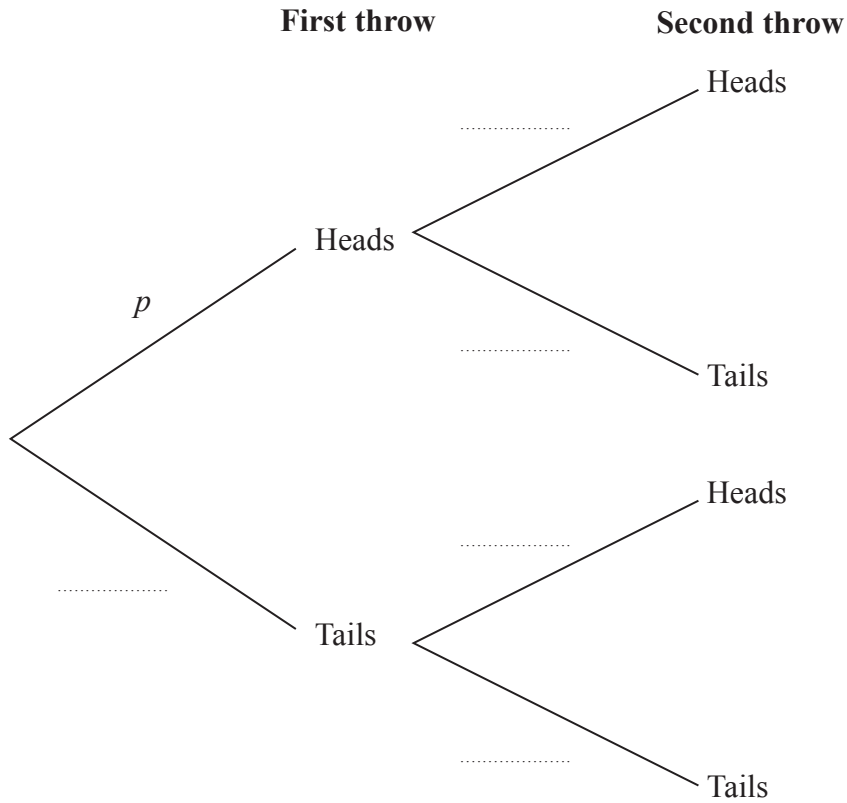
Do NOT write in this space.



13 Jim has a biased coin.

The probability that Jim will throw Heads on any throw is  $p$ .  
Jim throws the coin twice.

- (a) Complete the probability tree diagram.  
Give your probabilities in terms of  $p$ .



(2)

- (b) Find an expression, in terms of  $p$ , for the probability that Jim will throw two Heads.

.....  
(1)

Given that  $p = 0.8$ ,

- (c) work out the probability that Jim will throw exactly one Head.

.....  
(3)

**(Total for Question 13 is 6 marks)**





14 (a) Solve  $x^2 - 4x - 1 = 0$

Show your working clearly.

Give your solutions correct to 3 significant figures.

.....  
(3)

Hence, or otherwise,

(b) solve  $(x + 3)^2 - 4(x + 3) - 1 = 0$

giving your solutions correct to 3 significant figures.

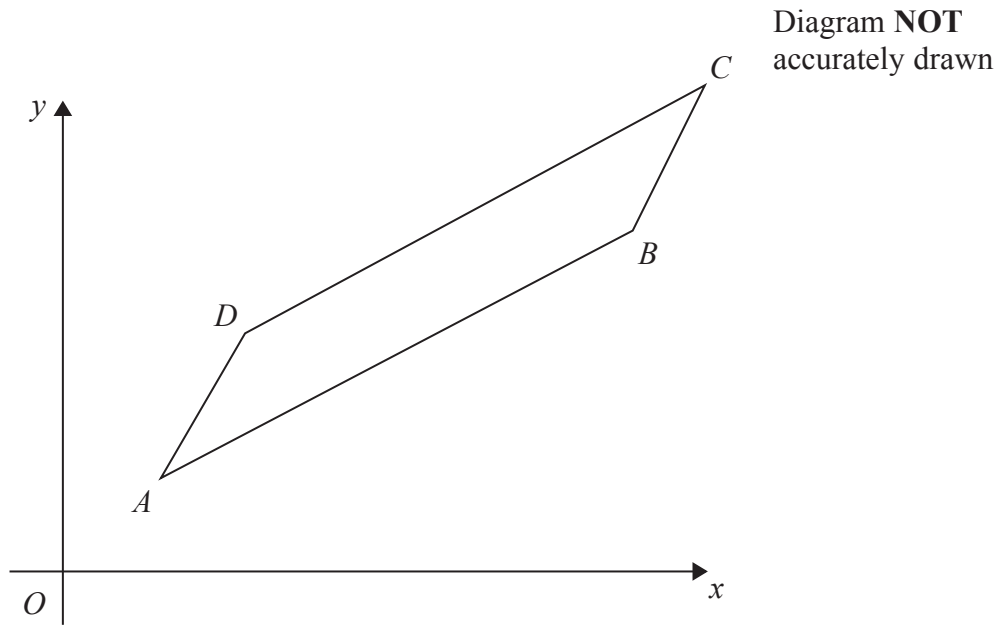
.....  
(1)

**(Total for Question 14 is 4 marks)**

**Do NOT write in this space.**



15 Here is the parallelogram  $ABCD$ .



$$\vec{AD} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}, \vec{AB} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$$

(a) Find the magnitude of  $\vec{AD}$ .

Give your answer correct to 3 significant figures.

.....  
(2)

The point  $A$  has coordinates  $(4, 2)$

(b) Work out the coordinates of the point  $C$ .

.....  
(3)



The diagonals of the parallelogram  $ABCD$  cross at the point  $E$ .

(c) Find as a column vector,  $\vec{OE}$ .

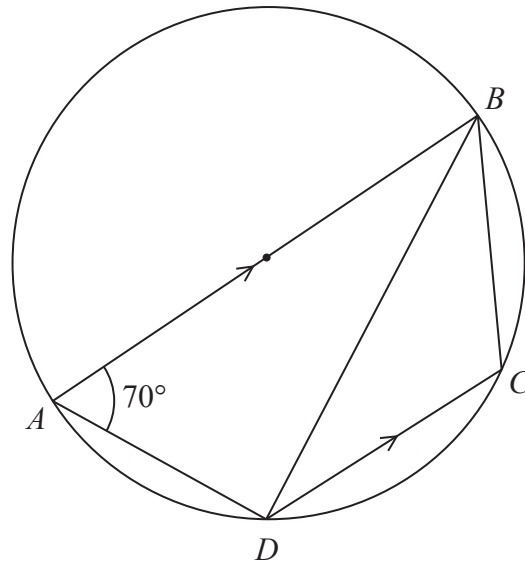
.....  
(3)

(Total for Question 15 is 8 marks)

Do NOT write in this space.



16

Diagram NOT  
accurately drawn

$A$ ,  $B$ ,  $C$  and  $D$  are points on a circle.  
 $AB$  is a diameter of the circle.  
 $DC$  is parallel to  $AB$ .  
 Angle  $BAD = 70^\circ$

(a) Calculate the size of angle  $BDC$ .

.....  
 (2)

The tangent to the circle at  $D$  meets the line  $BC$  extended at  $T$ .

(b) Calculate the size of angle  $BTD$ .

.....  
 (3)

(Total for Question 16 is 5 marks)



17 (a) Show that  $(3 + 2\sqrt{2})(4 - \sqrt{2}) = 8 + 5\sqrt{2}$

Show your working clearly.

(2)

(b) Rationalise the denominator and simplify fully  $\frac{10 + 3\sqrt{2}}{\sqrt{2}}$

Show your working clearly.

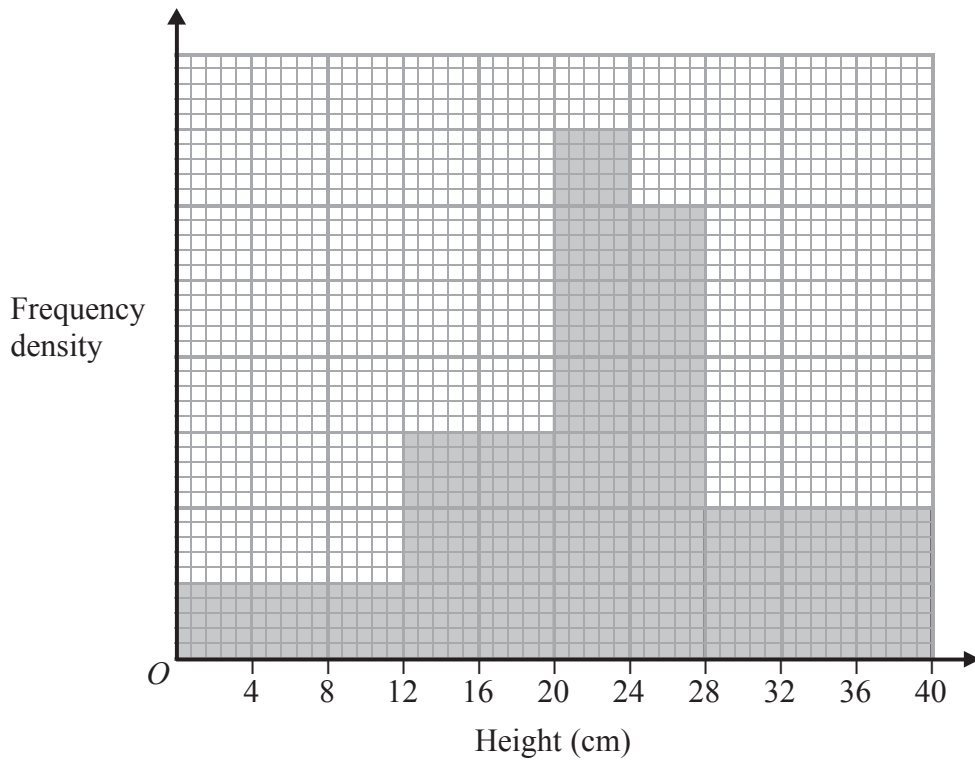
.....  
(2)

(Total for Question 17 is 4 marks)

**Do NOT write in this space.**



18



The histogram gives information about the heights of some plants.

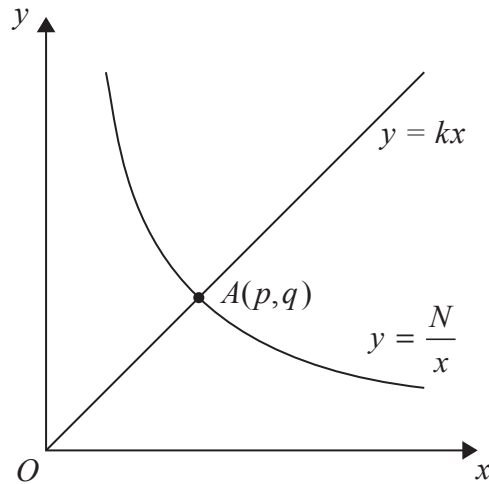
There are 360 plants with a height of 20 cm or less.

Work out the number of plants with a height of more than 20 cm.

(Total for Question 18 is 3 marks)



19



The diagram shows the straight line with equation  $y = kx$  intersecting the curve with equation  $y = \frac{N}{x}$  at the point  $A(p, q)$ .

(a) Find  $p$  and find  $q$ .

Give each answer in its simplest form, in terms of  $k$  and  $N$ .

$$p = \dots\dots\dots$$

$$q = \dots\dots\dots$$

(3)

Given that  $p = 2q$

(b) find the value of  $k$ .

$$k = \dots\dots\dots$$

(2)

(Total for Question 19 is 5 marks)



20 (a) Factorise  $4x^2 - 1$

.....  
(2)

(b) Solve  $\frac{4}{2x+1} + \frac{1}{4x^2-1} = 3$

Show clear algebraic working.

.....  
(4)

(Total for Question 20 is 6 marks)

---

TOTAL FOR PAPER IS 100 MARKS

