Write your name here

Surname	Other names

Pearson Edexcel Certificate
Pearson Edexcel
International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 4H

Higher Tier

Thursday 9 June 2016 – 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.

Turn over ▶

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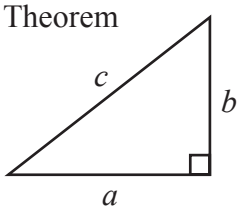
P 4 5 8 6 3 A 0 1 2 4

PEARSON

International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

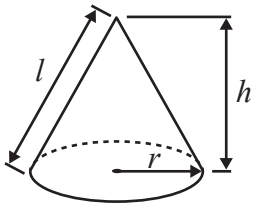
Pythagoras' Theorem



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

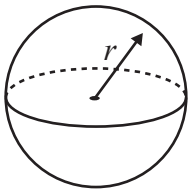
Volume of cone = $\frac{1}{3}\pi r^2 h$

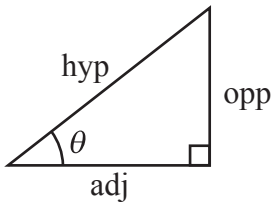
Curved surface area of cone = $\pi r l$



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

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





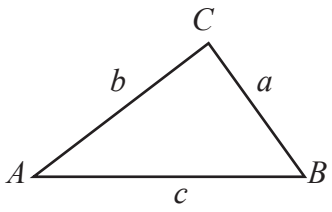
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

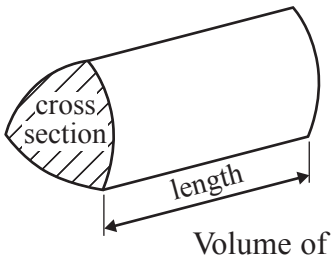
In any triangle ABC



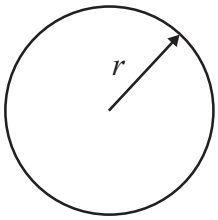
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



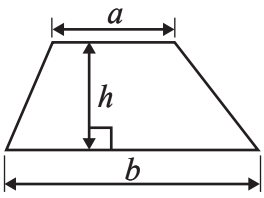
Volume of prism = area of cross section × length

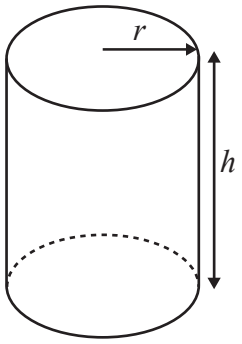


Circumference of circle = $2\pi r$

Area of circle = 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

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

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Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Here are the first five terms of an arithmetic sequence.

7 10 13 16 19

Find an expression for the nth term of the sequence.

.....

(Total for Question 1 is 2 marks)

2 Solve $8y - 18 = 3(y + 3)$
Show clear algebraic working.

$y =$ .....

(Total for Question 2 is 3 marks)

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3 In a sale, all normal prices are reduced by 20%

(a) The normal price of a television set is 485 euros.
Work out the sale price of the television set.

..... euros

(3)

(b) In the sale, the normal price of a tablet computer is reduced by 79 euros.
Work out the normal price of the tablet computer.

..... euros

(3)

(Total for Question 3 is 6 marks)

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4

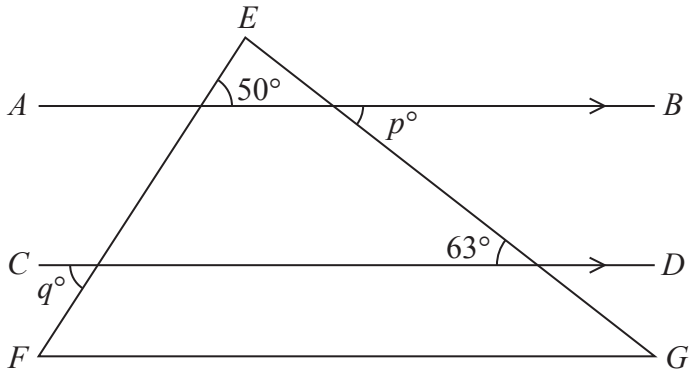

Diagram **NOT** accurately drawn

EFG is a triangle.
AB is parallel to *CD*.

(a) Write down the value of *p*

p = ...

(1)

(b) Write down the value of *q*

q = ...

(1)

Here is a hexagon.

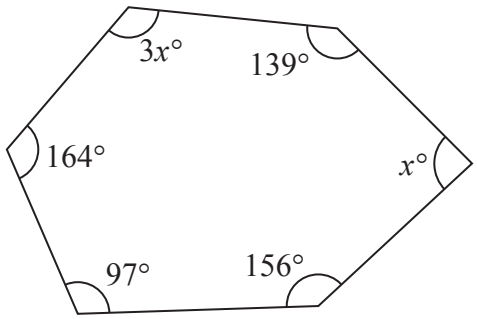

Diagram **NOT** accurately drawn

(c) Work out the value of *x*

x = ...

(3)

(Total for Question 4 is 5 marks)

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5 (a) Simplify $m^5 \times m^2$

.....

(1)

(b) Simplify $c^{11} \div c^3$

.....

(1)

(c) Simplify $(a^5)^3$

.....

(1)

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

.....

(2)

(Total for Question 5 is 5 marks)

6 Students in class 9Y took part in a sponsored swim.
The table gives information about the amount of money, in £, raised by each student.

Money raised (£x)	Frequency
$0 \leqslant x < 6$	4
$6 \leqslant x < 12$	6
$12 \leqslant x < 18$	8
$18 \leqslant x < 24$	9
$24 \leqslant x < 30$	3

Work out an estimate for the total amount of money raised by the students in class 9Y.

£.....

(Total for Question 6 is 3 marks)

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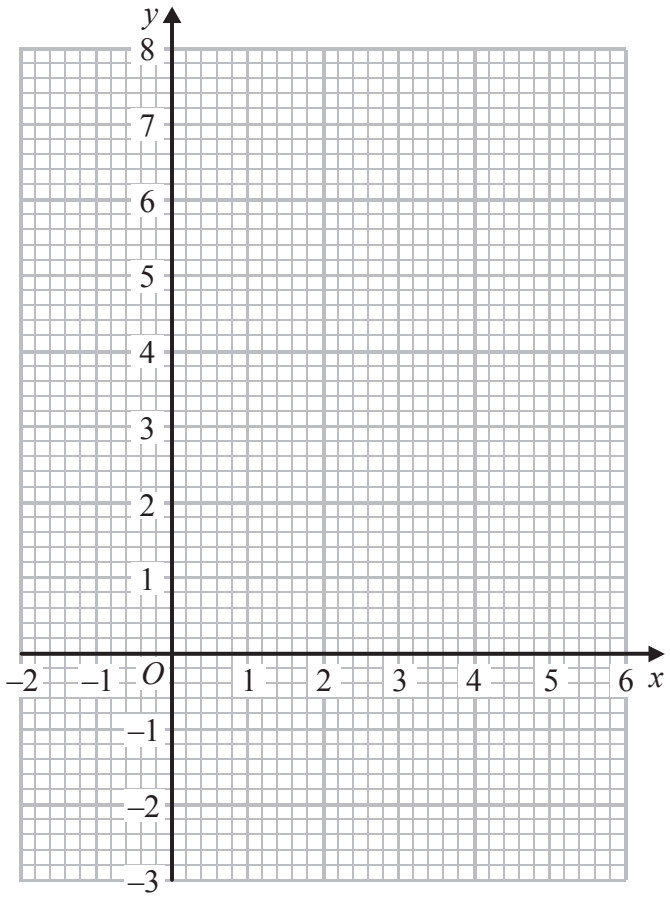
7 (a) Complete the table of values for $y = x^2 - 4x + 2$

x	–1	0	1	2	3	4	5
y		2		–2	–1		

(2)

(b) On the grid, draw the graph of $y = x^2 - 4x + 2$ for all values of x from –1 to 5



(2)

(Total for Question 7 is 4 marks)

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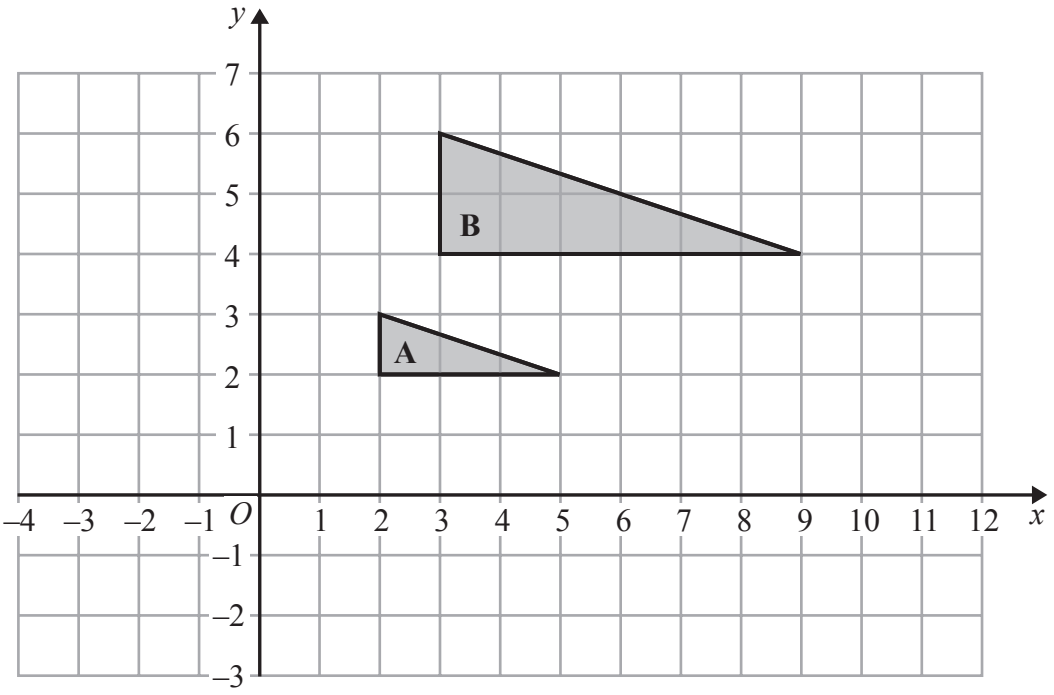
8



(a) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

.....

.....

(3)

(b) On the grid, translate triangle **A** by the vector $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$

Label the new shape **C**.

(1)

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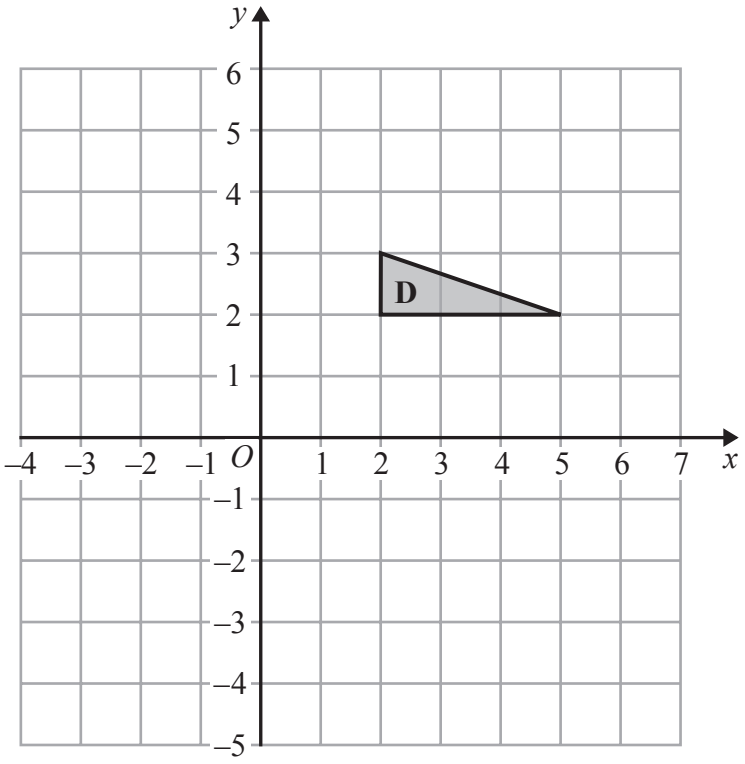

(c) On the grid, rotate triangle **D** 90° anticlockwise with centre (3, 1)

(2)

(Total for Question 8 is 6 marks)

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9

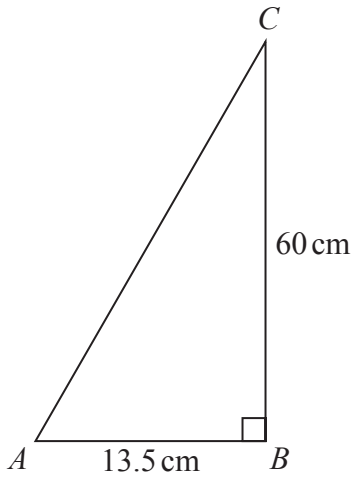

Diagram **NOT** accurately drawn

Work out the perimeter of the triangle.

..... cm

(Total for Question 9 is 4 marks)

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10 The highest common factor (HCF) of 140 and x is 20

The lowest common multiple (LCM) of 140 and x is 420

Find the value of x.

$x =$ .....

(Total for Question 10 is 2 marks)

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11 The table gives the populations of each of five countries in 2014

Country	Population
China	1.4×10^9
India	1.3×10^9
USA	3.2×10^8
Ethiopia	9.7×10^7
Mexico	1.2×10^8

(a) Write 9.7×10^7 as an ordinary number.

.....

(1)

The population of Russia in 2014 was 140 000 000

(b) Write 140 000 000 in standard form.

.....

(1)

In 2014, there were more people living in China than were living in the USA.

(c) How many more?
Give your answer in standard form.

.....

(2)

In 2014, the population of India was k times the population of Mexico.

(d) Work out the value of k.
Give your answer to the nearest whole number.

$k =$ .....

(2)

(Total for Question 11 is 6 marks)

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12

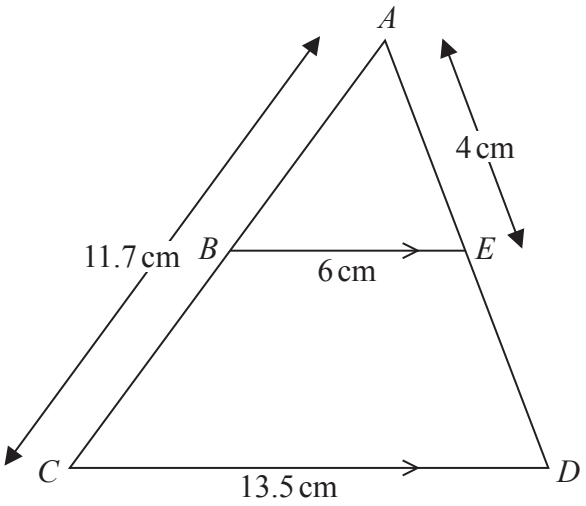

Diagram **NOT** accurately drawn

The diagram shows triangle ACD.
B is a point on AC and E is a point on AD so that BE is parallel to CD.

$AE = 4$ cm
$AC = 11.7$ cm
$BE = 6$ cm
$CD = 13.5$ cm

(a) Calculate the length of AB.

..... cm

(2)

(b) Calculate the length of ED.

..... cm

(2)

(Total for Question 12 is 4 marks)

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13 M is directly proportional to p^3
$M = 128$ when $p = 8$

(a) Find a formula for M in terms of p.

.....

(3)

(b) Find the value of M when $p = 5$

.....

(1)

(Total for Question 13 is 4 marks)

14 Simplify $\dfrac{x^2 - 25}{2x^2 - 9x - 5}$

.....

(Total for Question 14 is 3 marks)

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15 (a) Write $\frac{x+3}{5} + \frac{x-2}{3}$ as a single fraction in its simplest form.

.....

(3)

(b) Simplify $(8a^9e^6)^{\frac{1}{3}}$

.....

(2)

(c) Solve $\frac{2}{3}y + \frac{3}{8}y = 5$

Show clear algebraic working.

$y =$ .....

(3)

(Total for Question 15 is 8 marks)

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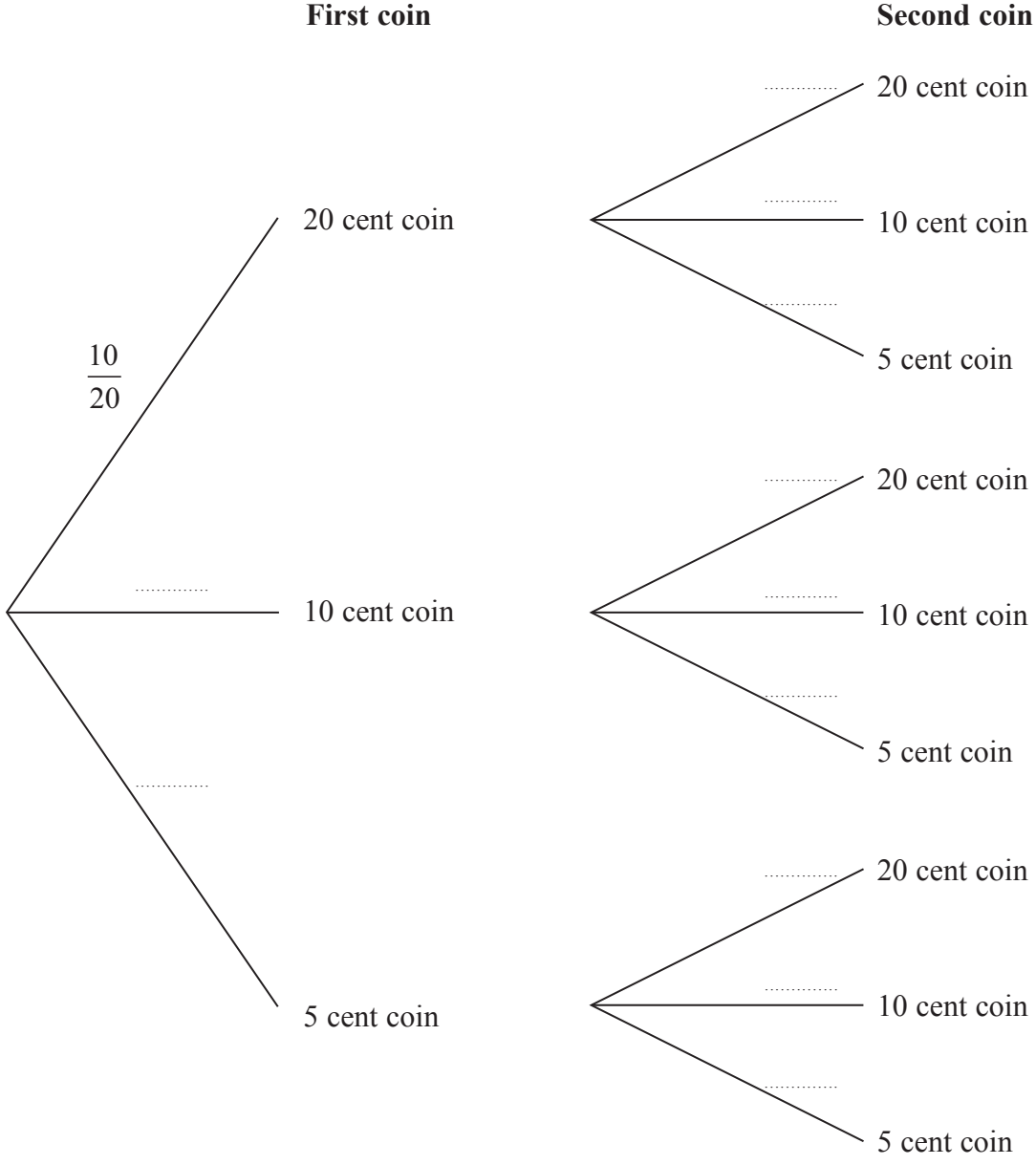
16 In a bag there is a total of 20 coins.

10 coins are 20 cent coins
6 coins are 10 cent coins
4 coins are 5 cent coins

Emma takes at random two of the coins from the bag.

(a) Complete the probability tree diagram.

(2)



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(b) Work out the probability that Emma takes two 5 cent coins.

.....

(2)

(c) Work out the probability that the total value of the two coins is 20 cents or less.

.....

(3)

(Total for Question 16 is 7 marks)

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17 f is the function such that $f(x) = 2x - 5$

g is the function such that $g(x) = x^2 - 10$

(a) Find f(4)

.....

(1)

(b) Find fg(–4)

.....

(2)

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

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

(2)

(d) Solve $gf(x) = -1$

.....

(4)

(Total for Question 17 is 9 marks)

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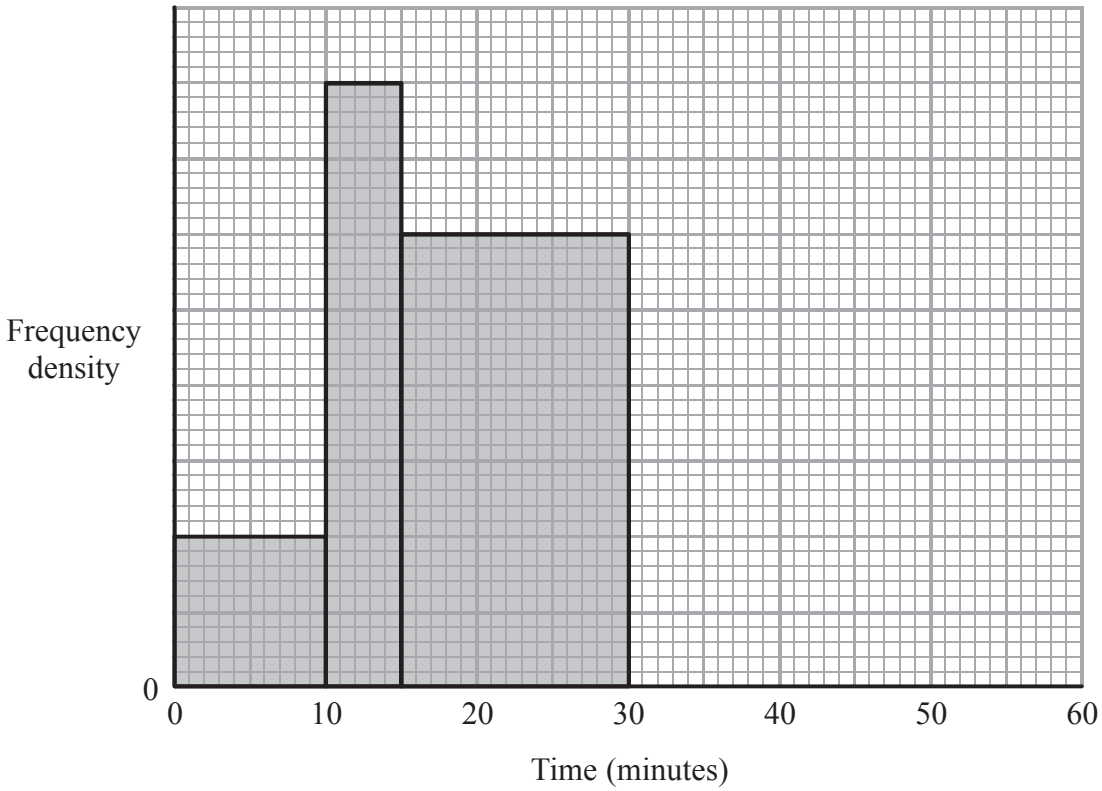
18 Miss Cook asked each student in her class how long it took them, in minutes, to travel to school that morning.
The incomplete histogram shows information about the times it took the students who took no more than 30 minutes to travel to school.



9 students took between 15 minutes and 30 minutes to travel to school.

(a) How many students took no more than 30 minutes to travel to school?

.....

(2)

12 students took between 30 and 55 minutes to travel to school.

(b) Use this information to complete the histogram.

(2)

(Total for Question 18 is 4 marks)

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19 Simplify $(7 + 2\sqrt{50})(5 - 2\sqrt{2})$

Give your answer in the form $a + b\sqrt{18}$ where a and b are integers.
Show your working clearly.

.....

(Total for Question 19 is 3 marks)

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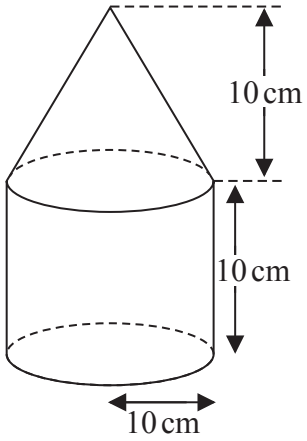

Diagram **NOT** accurately drawn

The diagram shows a solid shape made from a cone on top of a cylinder.

The cone has a radius of 10 cm and a height of 10 cm.
The cylinder has a radius of 10 cm and a height of 10 cm.
The centre of the base of the cone coincides with the centre of the top face of the cylinder.

The total surface area of the solid is A cm^2

Show that $A = (300 + 100\sqrt{2})\pi$

(Total for Question 20 is 4 marks)

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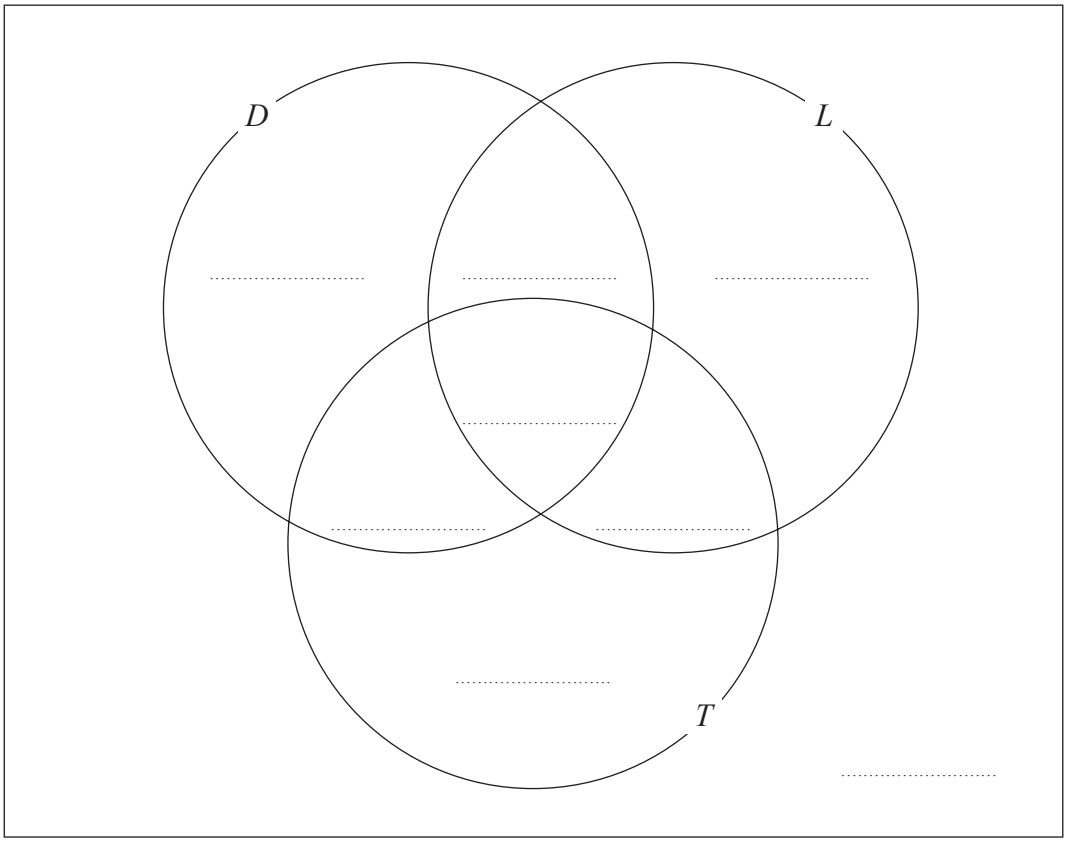
21 Each student in a group of 32 students was asked the following question.

"Do you have a desktop computer (D), a laptop (L) or a tablet (T)?"

Their answers showed that

19 students have a desktop computer
17 students have a laptop
16 students have a tablet
9 students have both a desktop computer and a laptop
11 students have both a desktop computer and a tablet
7 students have both a laptop and a tablet
5 students have all three.

(a) Using this information, complete the Venn diagram to show the number of students in each appropriate subset.



(3)

One of the students with both a desktop computer and a laptop is chosen at random.

(b) Find the probability that this student also has a tablet.

.....

(1)

(Total for Question 21 is 4 marks)

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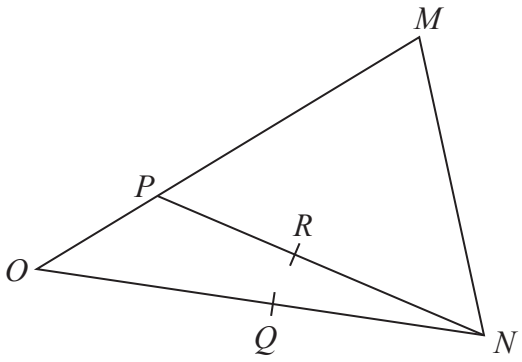

Diagram **NOT** accurately drawn

OMN is a triangle.

P is the point on *OM* such that $OP = \frac{1}{4} OM$

Q is the midpoint of *ON*

R is the midpoint of *PN*

$\overrightarrow{OP} = \mathbf{p}$ $\overrightarrow{OQ} = \mathbf{q}$

(a) Find, in terms of **p** and **q**,

(i) $\overrightarrow{MN}$

.....

(ii) $\overrightarrow{PR}$

.....

(2)

(b) Use a vector method to prove that *QR* is parallel to *OP*

(2)

(Total for Question 22 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

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