Write your name here

Surname		Other names

Pearson Edexcel
International GCSE

Centre Number

Candidate Number

Mathematics B
Paper 1R

Monday 11 January 2016 – Morning
Time: 1 hour 30 minutes

Paper Reference
4MB0/01R

Total Marks

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

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.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators may be used.**

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.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ▶

P46918A0124

PEARSON

Answer ALL TWENTY EIGHT questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1   Showing your working clearly, find the Lowest Common Multiple (LCM) of 24, 180 and 504.

....

(Total for Question 1 is 2 marks)

2   Work out $\dfrac{3^2 + 2^2}{3^5 - 2^5}$

(a) Give your answer as a decimal to 3 significant figures.

....

(1)

(b) Give your answer as a decimal to 3 decimal places.

....

(1)

(Total for Question 2 is 2 marks)

P46918A0224

3 Two circles touch each other. One of the circles has a diameter of 26 cm and the other circle has a diameter of 12 cm.

Write down

(a) the least distance between the centres of the two circles,

.... cm
(1)

(b) the greatest distance between the centres of the two circles.

.... cm
(1)

(Total for Question 3 is 2 marks)

4 Factorise fully $2x^3 - 162x$

....

5
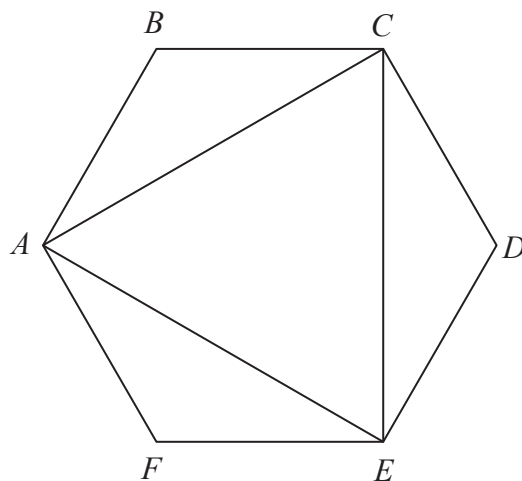
ABCDEF is a regular hexagon. For the shape above write down,

(a) the number of lines of symmetry of the shape,

....
(1)

(b) the order of rotational symmetry of the shape.

....
(1)

(Total for Question 5 is 2 marks)

6 The shares in *Varnton* mining company are priced at $13.60 each. This is 15% less than the price the previous week.

Work out the price, in $, of each share the previous week.

$ ....

(Total for Question 6 is 2 marks)

7 Simplify fully $(a^{\frac{1}{2}} + 1)(a^{\frac{1}{2}} - 1)$

....

(Total for Question 7 is 2 marks)

8 An aircraft flies from airport *X* to airport *Y*. There are three stages to the aircraft's route and these three stages are represented by the vectors $\begin{pmatrix} 85 \\ -124 \end{pmatrix}$, $\begin{pmatrix} 72 \\ -42 \end{pmatrix}$ and $\begin{pmatrix} -45 \\ -68 \end{pmatrix}$.

(a) Express, as a single vector, the direct route from *X* to *Y*.

....

(1)

(b) Express, as a single vector, the direct route from *Y* to *X*.

....

(1)

(Total for Question 8 is 2 marks)

9 Work out the matrix product $\begin{pmatrix} 3 & 0 \\ -4 & 4 \end{pmatrix}\begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix}$

$$\begin{pmatrix} & \\ & \end{pmatrix}$$

(Total for Question 9 is 2 marks)

10 Given that $y \neq 3x$, simplify fully $\dfrac{(6x + y)(y - 2x) - y^2}{y - 3x}$

....

(Total for Question 10 is 3 marks)

11 (a) Write 75 000 in standard form.

....

(1)

A computer can carry out a simple calculation in 1 picosecond where

1 picosecond $= 10^{-12}$ seconds

(b) Write down in standard form the time, in seconds, for this computer to carry out 75 000 simple calculations.

.... seconds

(2)

(Total for Question 11 is 3 marks)

12 n is an integer such that $9 < \dfrac{3n}{4} \leqslant 10.5$

List the possible values of n.

....

(Total for Question 12 is 3 marks)

---

13 A bag contains 100 discs.
x discs are red, y discs are blue and the rest are green.

Aanjay is going to take at random a disc from the bag.

Given that the probability that she takes a red disc is $\dfrac{9}{25}$

(a) find the value of x.

....

(1)

Bambang is going to take at random a disc from the bag with 100 discs. Bambang is not going to put the disc back in the bag but is going to take at random another disc from the bag.

Given that the probability that Bambang takes a red disc followed by a blue disc is $\dfrac{4}{25}$
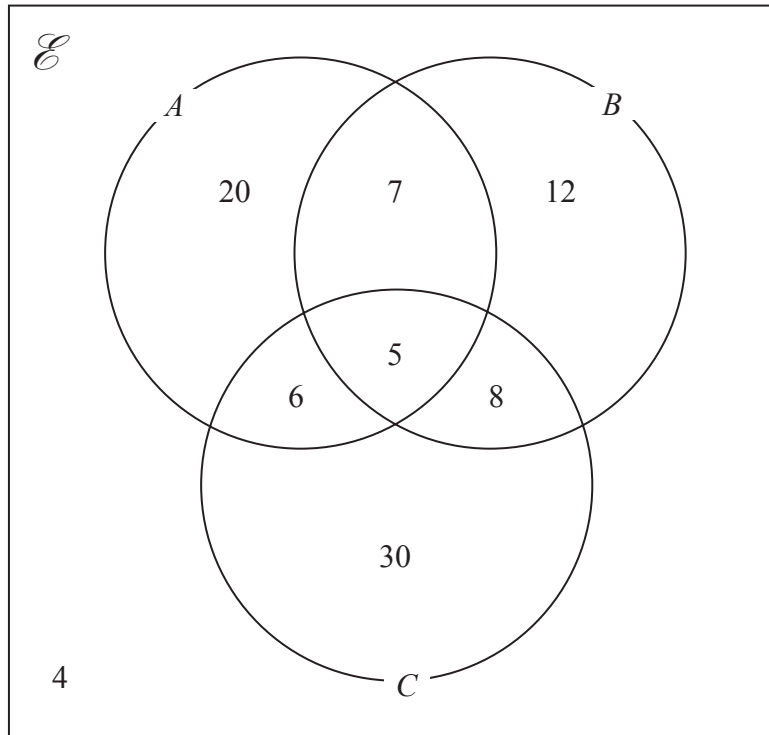
(b) find the value of y.

....

(2)

(Total for Question 13 is 3 marks)

14

The numbers shown in the Venn diagram are the **number** of elements in the given subset of $\mathcal{E}$.

Find

(a) n(A)

....

(1)

(b) n($[A \cup B] \cap C$)

....

(1)

(c) n($[A \cup B]'$)

....
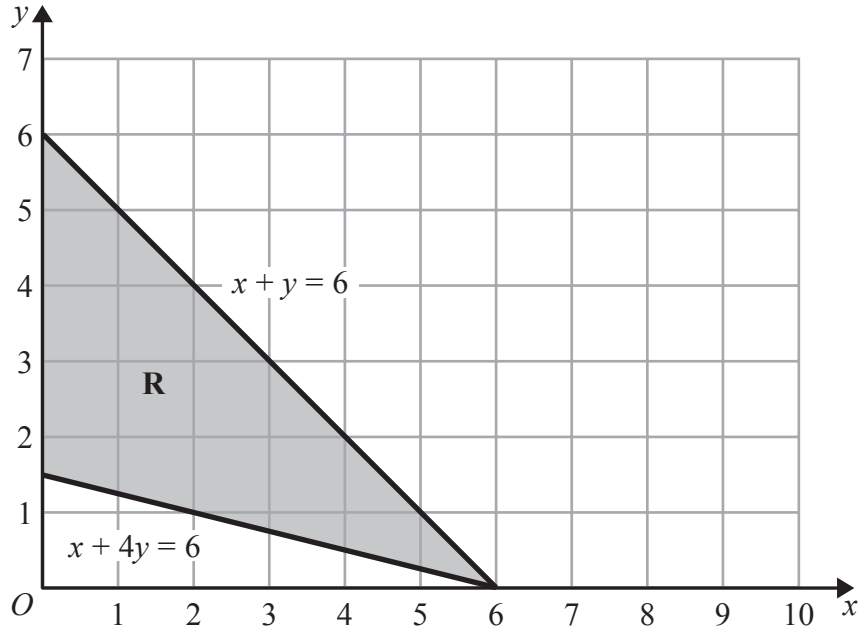
(1)

(Total for Question 14 is 3 marks)

15

Write down the three inequalities that define the region **R** in the diagram.

....

....

....

(Total for Question 15 is 3 marks)

16 $112 was divided between three prize winners in a competition in the ratios 9 : 4 : 1
The winner of the largest prize gave $6 to each of the other two prize winners.

Calculate the ratios of the amounts of money that the three prize winners now have.
Give your answer in its simplest form.

....

(Total for Question 16 is 4 marks)

17 (a) Express (i) $\sqrt{1944}$ in the form $m\sqrt{24}$ where m is an integer,

(ii) $\sqrt{384}$ in the form $n\sqrt{24}$ where n is an integer.

(i) ....

(ii) ....

(2)

(b) Hence, find the value of $\dfrac{\sqrt{1944} - \sqrt{384}}{\sqrt{24}}$

....

(1)

(Total for Question 17 is 3 marks)

Do NOT write in this space.

18

Diagram **NOT** accurately drawn
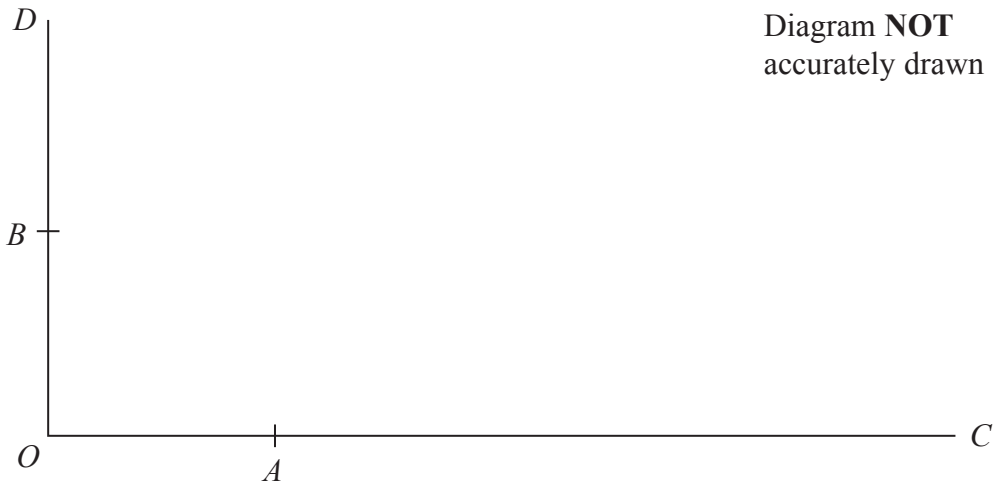
The point C is such that OAC is a straight line with $OA : OC = 1 : 4$
The point D is such that OBD is a straight line with $OB : OD = 1 : 2$
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$

(a) Write down, in terms of $\mathbf{a}$ and $\mathbf{b}$, the vector $\overrightarrow{DC}$.

$\overrightarrow{DC} = $ ....

(2)

The vectors $\mathbf{a}$ and $\mathbf{b}$ are perpendicular and $|\mathbf{a}| = 6$ and $|\mathbf{b}| = 5$

(b) Calculate $|\overrightarrow{DC}|$.

$|\overrightarrow{DC}| = $ ....

(2)

(Total for Question 18 is 4 marks)

Turn over ▶

19 y varies inversely as the cube of x.

Given that $y = 12.5$ when $x = 2.5$, find the value of x when $y = 100$

$x = $ ....

(Total for Question 19 is 4 marks)

20 Make x the subject of $\dfrac{y - x}{1 + xy} = \dfrac{2}{3}$

....

(Total for Question 20 is 4 marks)

21 Two solid spheres have surface areas in the ratio 9 : 16
The volume of the smaller sphere is 13.5 cm^3
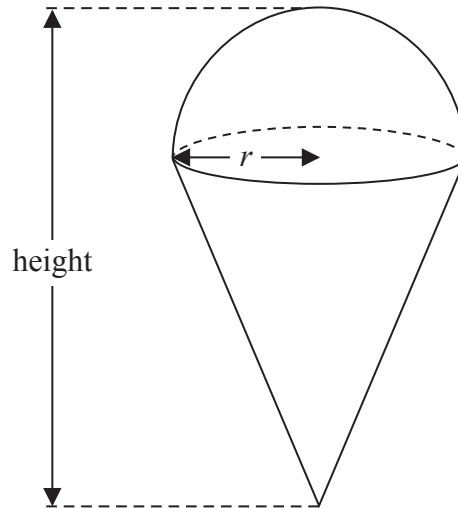
Calculate the volume, in cm^3, of the larger sphere.

.... cm^3

(Total for Question 21 is 4 marks)

22

Diagram **NOT**
accurately drawn

height

r

A toy is made by joining a solid hemisphere of radius r to a right circular cone of base radius r. The plane face of the cone coincides with the plane face of the hemisphere. The axis of symmetry of the toy is vertical and the hemisphere is on top of the cone, as shown in the diagram.

Given that the volume of the cone is equal to the volume of the hemisphere, find the height of the toy, in terms of r.

....

(Total for Question 22 is 4 marks)

Turn over ▶

23 Given that, for all values of x,

$$6x^3 + 7x^2 - 56x + 48 = (2x^2 + kx - 12)(3x - 4) \quad \text{where } k \text{ is a constant,}$$

(a) find the value of k.

$$k = \text{...}$$

(b) Hence factorise completely $6x^3 + 7x^2 - 56x + 48$

....

(Total for Question 23 is 5 marks)

24 Solve $\dfrac{2}{2x+1} + \dfrac{3}{7-x} = 1$

....

(Total for Question 24 is 6 marks)

Turn over ▶

25 In an office survey, the lengths, in minutes, of 60 telephone calls were recorded. Information about the results is shown in the following table.

| Length of telephone call (t minutes)	Number of telephone calls
$0 < t \leqslant 2$	14
$2 < t \leqslant 6$	24
$6 < t \leqslant 10$	12
$10 < t \leqslant 15$	10

(a) Calculate an estimate for the mean length, in minutes, of the 60 telephone calls. Give your answer to 3 significant figures.

.... minutes

(3)

A histogram is to be drawn for the information in the table. The first bar of the histogram has been drawn.
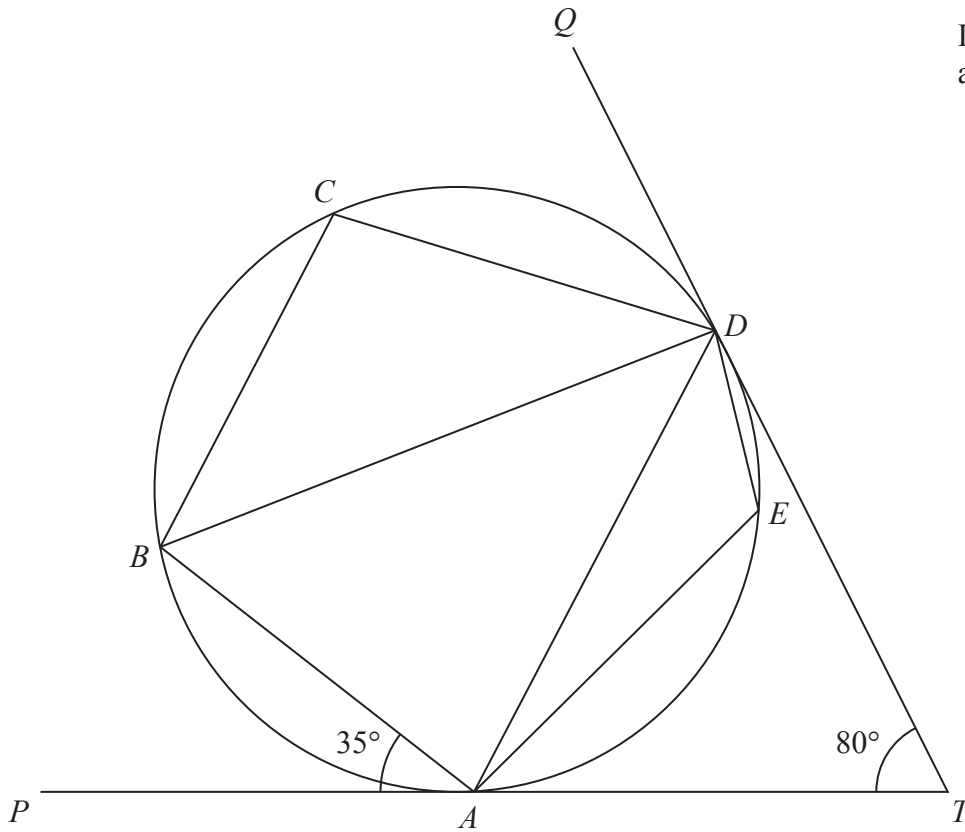
(b) Complete the histogram.

Length of telephone call (*t* minutes)

(3)
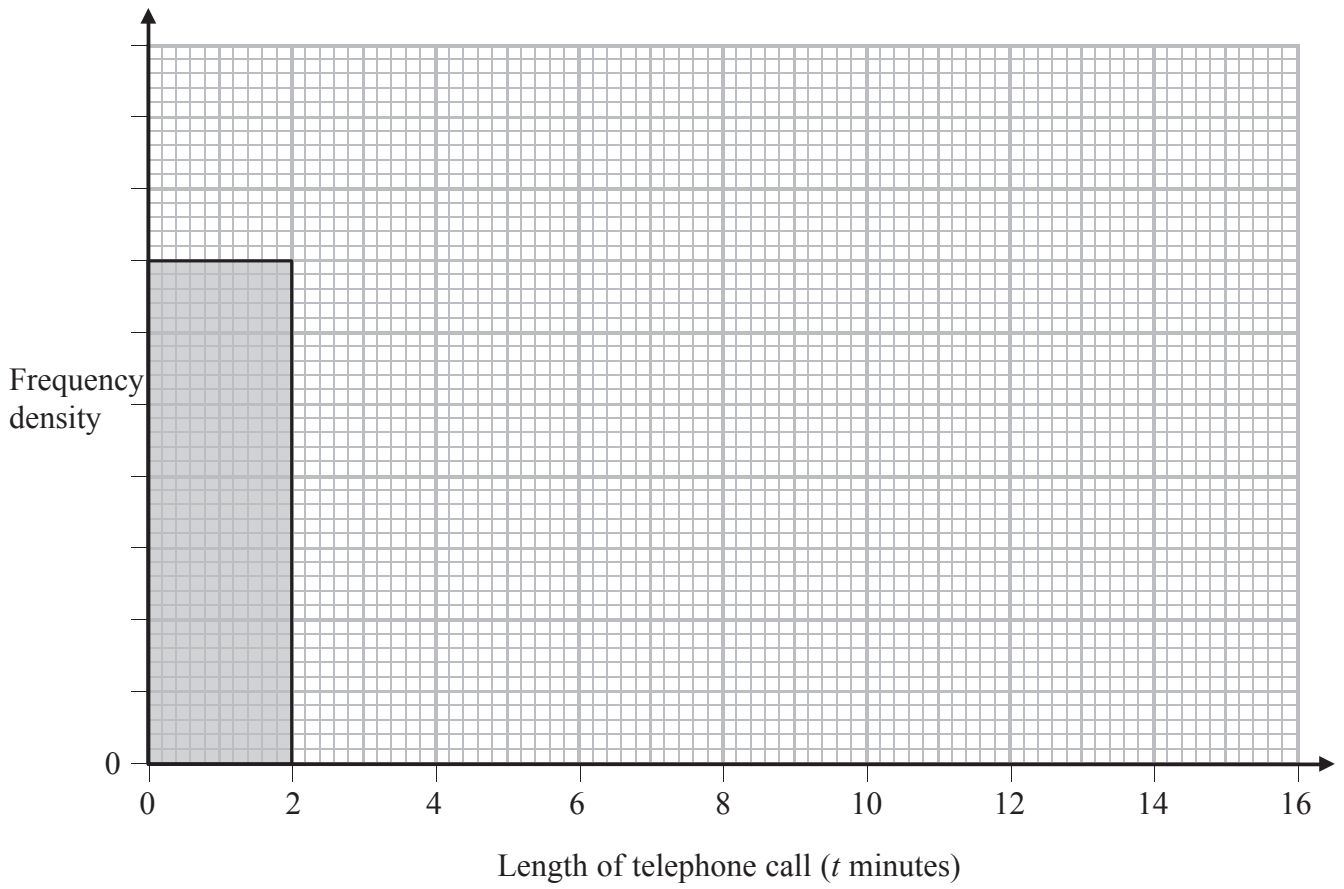
(Total for Question 25 is 6 marks)

P 4 6 9 1 8 A 0 1 7 2 4

Q

Diagram **NOT**
accurately drawn

C

D

E

B

35°

80°

P

A

T

ABCDE is a circle. The tangents at *A* and *D* meet at the point *T* and ∠*DTA* = 80°
TAP and *TDQ* are straight lines.
∠*BAP* = 35°

Giving reasons, calculate the size, in degrees, of

(a) ∠*DAT*,

∠*DAT* = ... °

(2)

(b) $\angle BCD$,

$\angle BCD =$ .... °

(2)

(c) $\angle DEA$.

$\angle DEA =$ .... °

(2)

(Total for Question 26 is 6 marks)

27 The sizes of the three angles of a triangle are in the ratios 2 : 3 : 4

(a) Find the size, in degrees, of the smallest angle of the triangle.

.... °

(2)

The longest side of the triangle is 8 cm.

(b) Calculate the length, in cm to 3 significant figures, of the shortest side of the triangle.

.... cm

(3)

(c) Calculate the area, in cm² to 3 significant figures, of the triangle.

.... cm²

(2)

(Total for Question 27 is 7 marks)

28 A curve C has equation $y = -x^3 + 5x^2 - 8x + 4$

(a) Find $\dfrac{dy}{dx}$

$$\dfrac{dy}{dx} = \text{.................................}$$
<div align="right">(2)</div>

The gradient of C at the point where $x = \dfrac{7}{3}$ on C is -1

(b) Calculate the coordinates of the other point on C at which the gradient is -1

<div align="right">.................................</div>
<div align="right">(5)</div>

<div align="center">(Total for Question 28 is 7 marks)</div>

<div align="center">**TOTAL FOR PAPER IS 100 MARKS**</div>

BLANK PAGE

BLANK PAGE

BLANK PAGE