Write your name here

Surname	Other names

Pearson Edexcel
International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics B

Paper 1R

Friday 10 January 2014 – Morning
Time: 1 hour 30 minutes

Paper Reference
4MB0/01R

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.
- 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 ▶

P43132A

6/1/1/1/

P 4 3 1 3 2 A 0 1 2 0

PEARSON

Answer ALL TWENTY EIGHT questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1

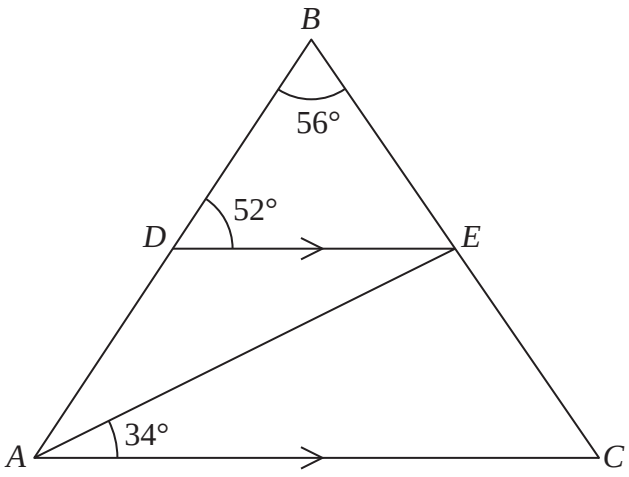


Diagram **NOT** accurately drawn

In triangle ABC, $\angle ABC = 56°$
The point D on AB, and the point E on BC, are such that DE is parallel to AC.
$\angle BDE = 52°$ and $\angle EAC = 34°$

Find the size of

(a) $\angle DAE$,

$\angle DAE$ = ... °

(1)

(b) $\angle AEC$.

$\angle AEC$ = ... °

(1)

(Total for Question 1 is 2 marks)

2 Given that $c^2 = 9^3 + 6^4$, and that c is positive, find the value of c.

$c =$ .....

(Total for Question 2 is 2 marks)

3 A shopkeeper had a delivery of a box of apples. Of these apples, $\frac{2}{7}$ were bad and could not be sold. The shopkeeper sold all the other 105 apples from the box.
Find the total number of apples delivered in the box.

.....

(Total for Question 3 is 2 marks)

4 Factorise completely $2ac - 4ad + bc - 2bd$.

.....

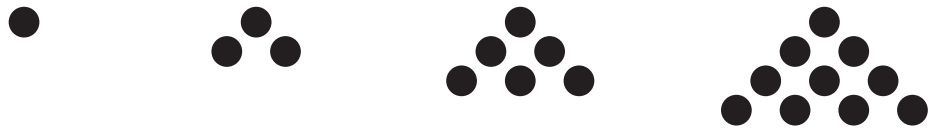
(Total for Question 4 is 2 marks)

5 A particle moves in a straight line so that, at time t seconds, the velocity, v m/s, of the particle is given by $v = 6t^3 - 15t^2$. The acceleration of the particle at time t seconds is a m/s^2. Find an expression for a in terms of t.

$a =$ .....

(Total for Question 5 is 2 marks)

6



1 **3** **6** **10**

The first four numbers in the sequence of triangle numbers are 1, 3, 6, 10

(a) Write down the 5th number in this sequence.

.....

(1)

(b) Write down the difference between the 100th number and the 99th number in this sequence.

.....

(1)

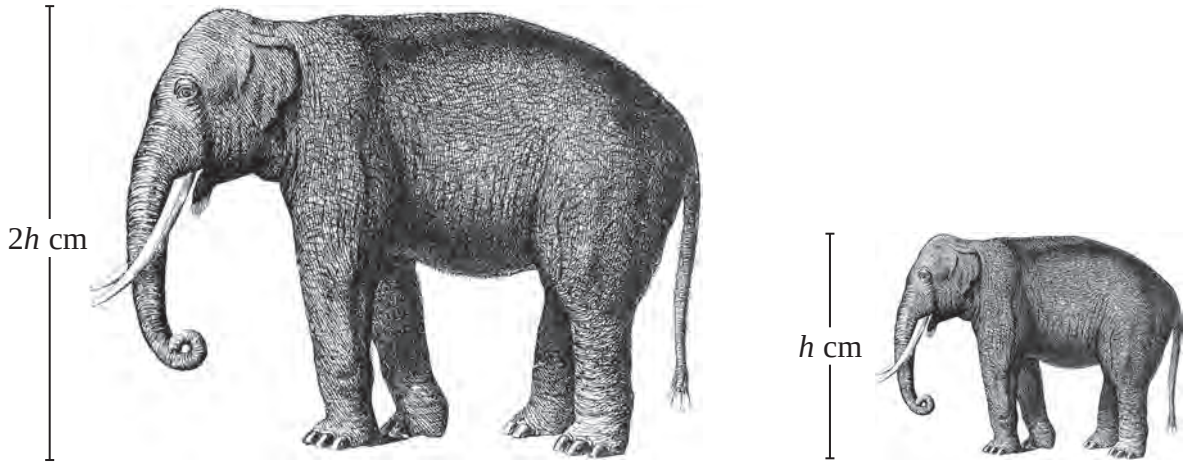
(Total for Question 6 is 2 marks)

7 A and B are two sets. Given that $n(A) = 20$, $n(B) = 15$ and $n(A \cap B) = 6$, find $n(A \cup B)$.

.....

(Total for Question 7 is 2 marks)

8



A **B**

Two models of elephants were bought by Shenaz. The models are mathematically similar, with elephant **A** twice the height of elephant **B**. Given that the volume of elephant **A** is 240 cm^3, calculate the volume, in cm^3, of elephant **B**.

..... cm^3

(Total for Question 8 is 2 marks)

9 The point Q with coordinates $(5, p)$ is a point on the line with equation $2x - 3y = 4$

Find the value of p.

$p =$ .....

(Total for Question 9 is 2 marks)

10 Solve the equation $2x^2 + 11x - 6 = 0$

.....

(Total for Question 10 is 3 marks)

11 $a = 2^{-1}$, $b = 2^0$, $c = \left(\frac{1}{2}\right)^{-1}$, $d = \left(\frac{1}{8}\right)^{\frac{1}{3}}$, $e = \left(\frac{1}{4}\right)^{-2}$, $f = 2^2$

From the list of numbers,

(a) write down the letters of the two equal numbers,

.....

(2)

(b) write down the letter of the largest number.

.....

(1)

(Total for Question 11 is 3 marks)

12 From an online website, I purchased an electronic gadget from Singapore. The cost of the gadget in Singapore dollars (SGD) was 82 SGD. The total I paid for the gadget and the postage in British pounds (GBP) was 50 GBP.
The exchange rate was 1 SGD = 0.5036 GBP.

Calculate the cost of the postage in SGD. Give your answer to 2 decimal places.

..... SGD

(Total for Question 12 is 3 marks)

13 Find the smallest integer which satisfies the inequality $4(7 - x) \leqslant 9$

.....

(Total for Question 13 is 3 marks)

14 (a) Given that $\mathbf{A} = \begin{pmatrix} x & 0 \\ -x & -x \end{pmatrix}$, find, in terms of x, $\mathbf{A}^2$

$\mathbf{A}^2 = \begin{pmatrix} & \\ & \end{pmatrix}$

(2)

(b) Given that $\mathbf{A}^2 = 9\mathbf{I}$, where $\mathbf{I} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, find a value of x.

$x =$ .....

(1)

(Total for Question 14 is 3 marks)

15 The equation of a straight line is given by $2x + 3y = 12$

(a) Find the gradient of the line.

.....

(2)

(b) Write down the coordinates of the point of intersection of the line with the y-axis.

.....

(1)

(Total for Question 15 is 3 marks)

16 Given that $y = 4x^2 - \frac{1}{x}$

(a) find $\frac{dy}{dx}$

$\frac{dy}{dx} =$ .....

(2)

(b) Solve $\frac{dy}{dx} = 0$

.....

(2)

(Total for Question 16 is 4 marks)

17

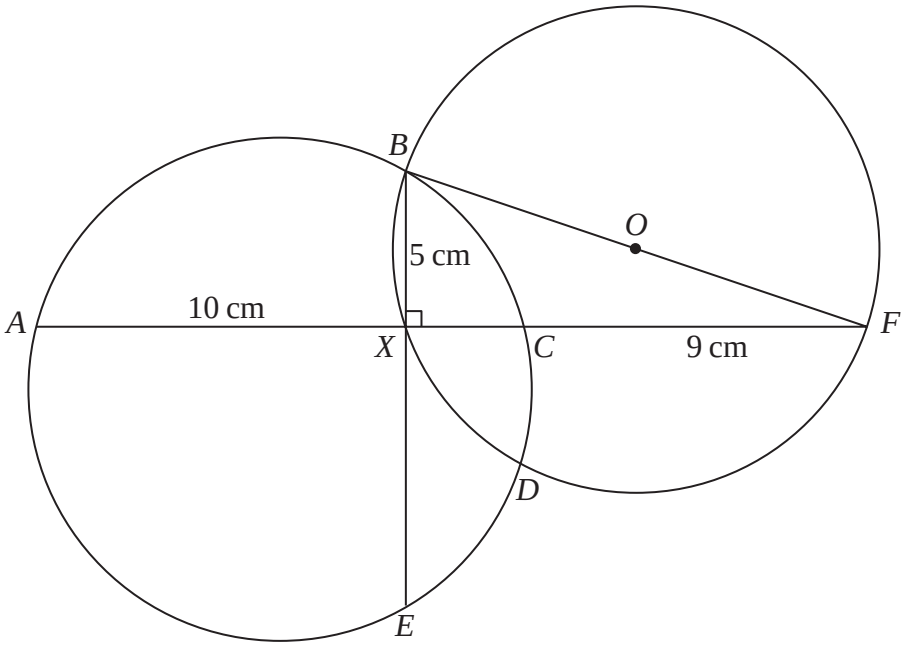


Diagram **NOT** accurately drawn

The diagram shows two chords, *AC* and *BE*, of a circle *ABCDE*. The chords intersect at the point *X* with $AX = 10$ cm, $BX = 5$ cm and $\angle BXC = 90°$

The straight line *AXC* is extended to the point *F* where $CF = 9$ cm.

The diagram also shows a second circle *BFDX*, centre *O*, with diameter *BF*.

Given that $BF = 13$ cm, find the length, in cm, of *XE*.

XE = ... cm

(Total for Question 17 is 4 marks)

18 The sum of the interior angles of a regular polygon is 2340°
Calculate the size, in degrees, of an exterior angle of this polygon.

.....°

(Total for Question 18 is 4 marks)

19 $\overrightarrow{OA} = \begin{pmatrix} 6 \\ -8 \end{pmatrix}$ and $\overrightarrow{OB} = \begin{pmatrix} -2 \\ 7 \end{pmatrix}$

(a) Find, as a column vector, $\overrightarrow{AB}$

$\overrightarrow{AB} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$

(2)

(b) Calculate the modulus of $\overrightarrow{AB}$

.....

(2)

(Total for Question 19 is 4 marks)

20 The cost of fuel for a car is £1.42 per litre.

A motorist fills up the fuel tank of his car completely at a cost of £44.73

(a) Calculate the number of litres of fuel that the motorist put into his car.

..... litres

(2)

Before the motorist started to put fuel into the fuel tank of his car, the tank was 90% empty.

(b) Calculate, in litres, the amount of fuel in the completely full fuel tank of the motorist's car.

..... litres

(2)

(Total for Question 20 is 4 marks)

21 y varies inversely as the square of x. When $x = 4$, $y = 3$
Find the value of y when $x = 8$

$y =$ .....

(Total for Question 21 is 4 marks)

22 (a) Express

(i) $\sqrt{32}$ in the form $a\sqrt{2}$

.....

(ii) $\sqrt{72}$ in the form $b\sqrt{2}$

.....

(2)

(b) Hence show that $(3 + \sqrt{32})(\sqrt{72} - 3)$ can be written in the form $c + d\sqrt{2}$ where c and d are integers to be found.

(3)

(Total for Question 22 is 5 marks)

---

23 A layer of a microchip has a length of 4 mm, a width of 5 mm and a thickness of 1.8×10^{-4} mm.

(a) Calculate the volume, in mm^3, of one layer of the microchip. Give your answer in standard form.

..... mm^3

(3)

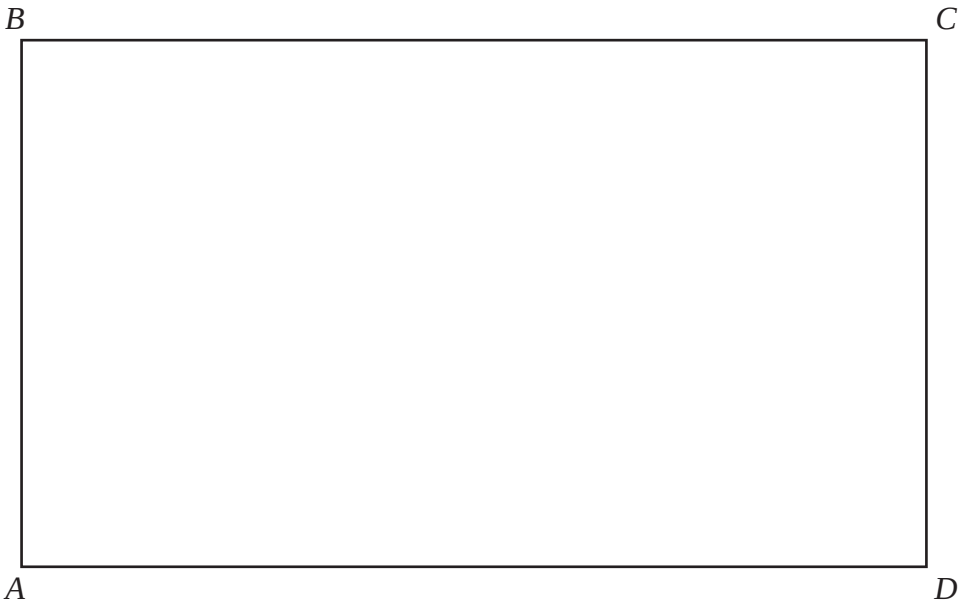
(b) Calculate the number of these microchip layers needed to give a total thickness of 0.9 mm.

.....

(2)

(Total for Question 23 is 5 marks)

24



ABCD is a rectangle.

Showing all your construction lines, construct the locus of all points inside the rectangle which are

(a) equidistant from *C* and *D*,

(2)

(b) equidistant from *AB* and *AD*.

(2)

The two loci intersect at the point *P*.

(c) Measure and write down the distance, in cm to 1 decimal place, from *P* to *C*.

.....cm

(1)

(Total for Question 24 is 5 marks)

25 A school class has 30 pupils.

The shoe size of each pupil is recorded and this table shows information about these results.

Size of shoe	3	4	5	6	7	8	9
Number of pupils	2	5	8	9	3	2	1

For this information, find

(a) the mode,

.....

(1)

(b) the median,

.....

(2)

(c) the mean.

.....

(3)

(Total for Question 25 is 6 marks)

26

$$f : x \mapsto 5x - 4$$

$$g : x \mapsto 2 - \frac{3}{x + 10}$$

(a) Write down the value of x which must be excluded from any domain of g

.....

(1)

(b) Find the value of g(–2.5).

.....

(1)

(c) Find and simplify an expression for fg(x).

.....

(2)

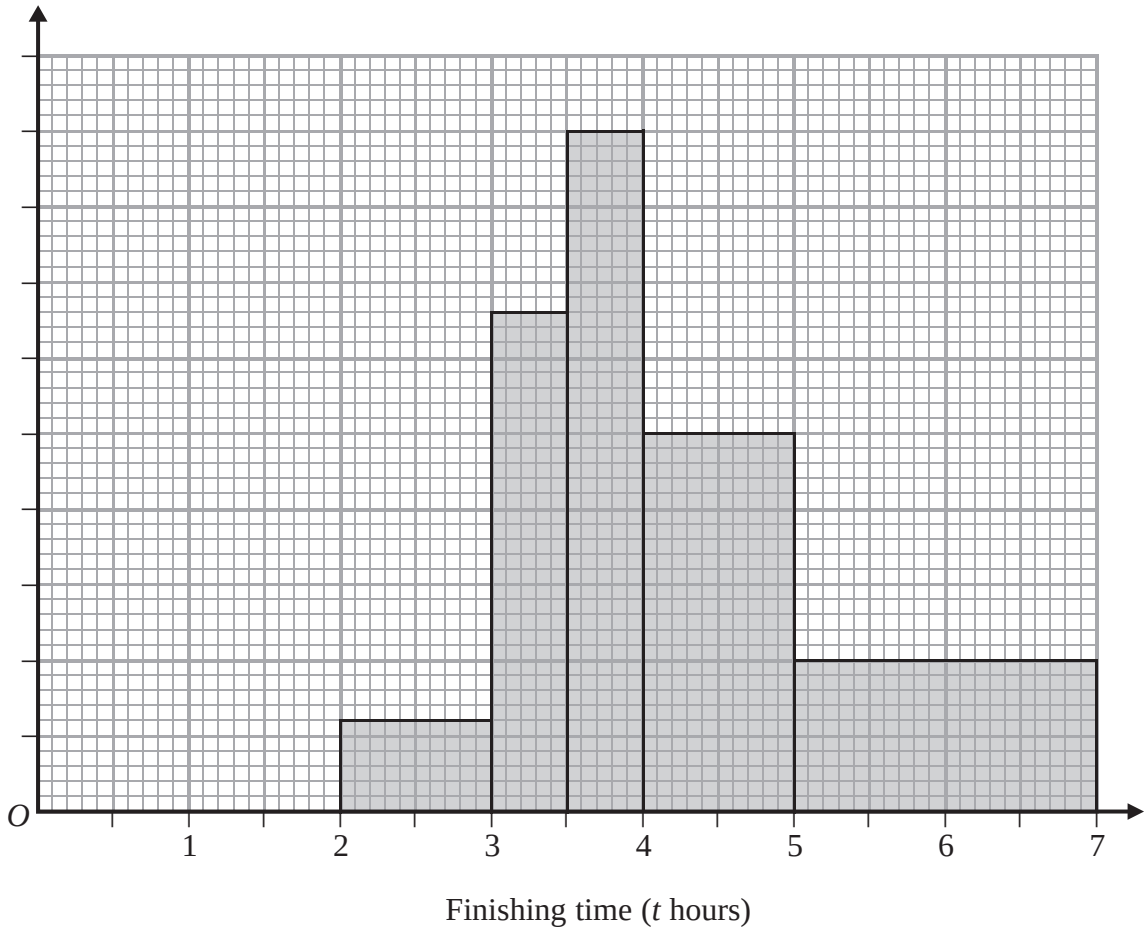
(d) Solve the equation fg(x) = 3

.....

(2)

(Total for Question 26 is 6 marks)

27 225 runners took part in the *Ambling* marathon. The finishing times (t hours) of those runners who completed the marathon were recorded. The histogram below was drawn for these results.



(a) Use the histogram and the information in the table, to complete the table.

Finishing time (t hours)	**Frequency**
$2 < t \leqslant 3$	
$3 < t \leqslant 3.5$	33
$3.5 < t \leqslant 4$	
$4 < t \leqslant 5$	
$5 < t \leqslant 7$	

(4)

(b) Calculate the percentage of the 225 runners who did not complete the marathon.

..... %

(2)

(Total for Question 27 is 6 marks)

Do NOT write in this space.

Question 28 starts on the next page.

28

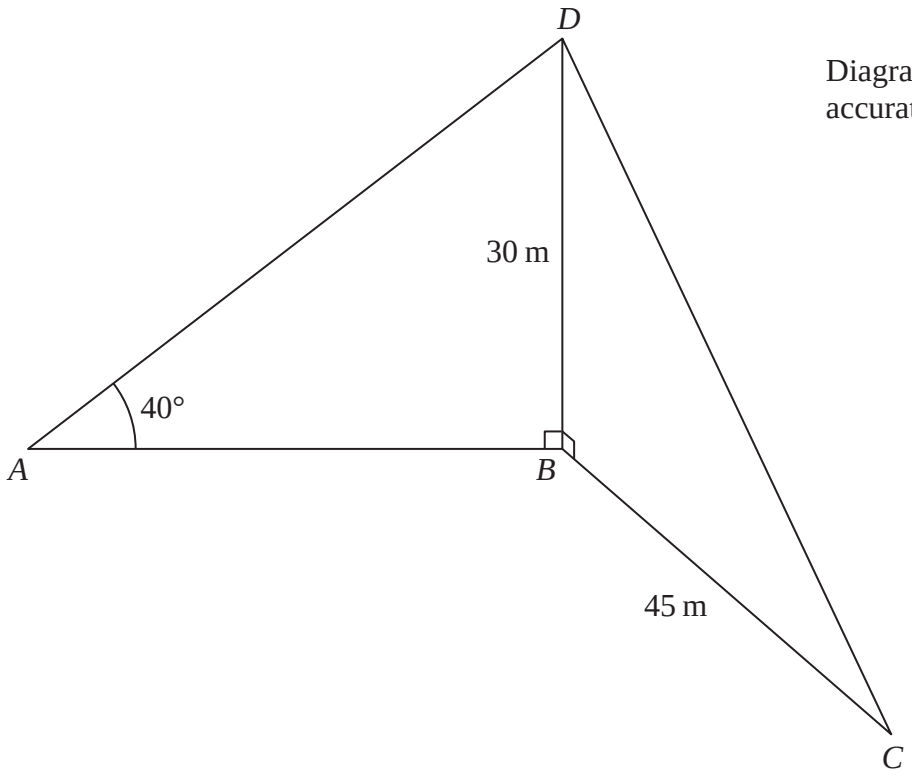


Diagram **NOT** accurately drawn

A, *B* and *C* are three points on a horizontal plane. The point *C* is due South of the point *B* and the point *A* is due West of the point *B*.

A vertical pole, *BD*, at *B* is supported by two cables, *AD* and *CD*.

BD = 30 m, *BC* = 45 m and $\angle DAB = 40°$

Find, giving your answers to 3 significant figures,

(a) the length, in m, of the cable *AD*,

.....m

(2)

(b) the angle of elevation of the point *D* from the point *C*,

.....°

(2)

(c) the bearing of the point *A* from the point *C*.

.....°

(3)

(Total for Question 28 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS

Do NOT write in this space.

BLANK PAGE

Do NOT write on this page.