Centre No.						Paper Reference	Surname	Initial(s)
Candidate No.						**7 3 6 1 / 0 1**	Signature	

7361/01

London Examinations GCE

Mathematics Syllabus B
Ordinary Level
Paper 1

Tuesday 11 January 2011 – Afternoon

Time: 1 hour 30 minutes

Materials required for examination	**Items included with question papers**
Nil	Nil

Candidates are expected to have an electronic calculator when answering this paper.

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
Full marks may be obtained for answers to ALL questions.
There are 28 questions in this question paper. The total mark for this paper is 100.
There are 20 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Write your answers neatly and legibly.

Turn over

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1. (a) Express $\dfrac{3}{49}$ as a decimal to 3 significant figures.

....
(1)

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

....
(1)

Q1

(Total 2 marks)

2.

$\mathscr{E}$ = {polygons},
H = {hexagons},
R = {rectangles},
S = {squares}.

Represent these sets in a Venn diagram.

$\mathscr{E}$

Q2

(Total 2 marks)

3.

$$f : x \mapsto \frac{1}{3x+1}$$

Complete and simplify $f^{-1} : x \mapsto \ ......$

$f^{-1} : x \mapsto$ **Q3**

(Total 2 marks)

---

4. The point *B* has coordinates (2,3) and the point *C* has coordinates (1,4), relative to the origin *O*.

Write in the form $\begin{pmatrix} x \\ y \end{pmatrix}$, the vector

(a) $\overrightarrow{OC}$,

....
(1)

(b) $\overrightarrow{BC}$.

....
(1) **Q4**

(Total 2 marks)

---

5. Find the lowest common multiple (LCM) of 6, 12 and 20
You must show all your working.

....
Q5

(Total 2 marks)

6.

C

B   D

A

ABCD is a kite.

Write down

(a) the number of lines of symmetry of *ABCD*,

....
(1)

(b) the order of rotational symmetry of *ABCD*.

....
(1)   **Q6**

(Total 2 marks)

7. The *n*th term of a sequence is $3n - 2$
Calculate the difference between the 5th and the 3rd terms.

....   **Q7**

(Total 2 marks)

N 3 6 6 5 6 A 0 4 2 0

8. Describe, in set notation, the shaded region in each of the Venn diagrams below.

(a)

....
(1)

(b)

....
(1)

(Total 2 marks)

9. Given that $x = 2 \times 10^{10}$ and $y = 16 \times 10^{11}$
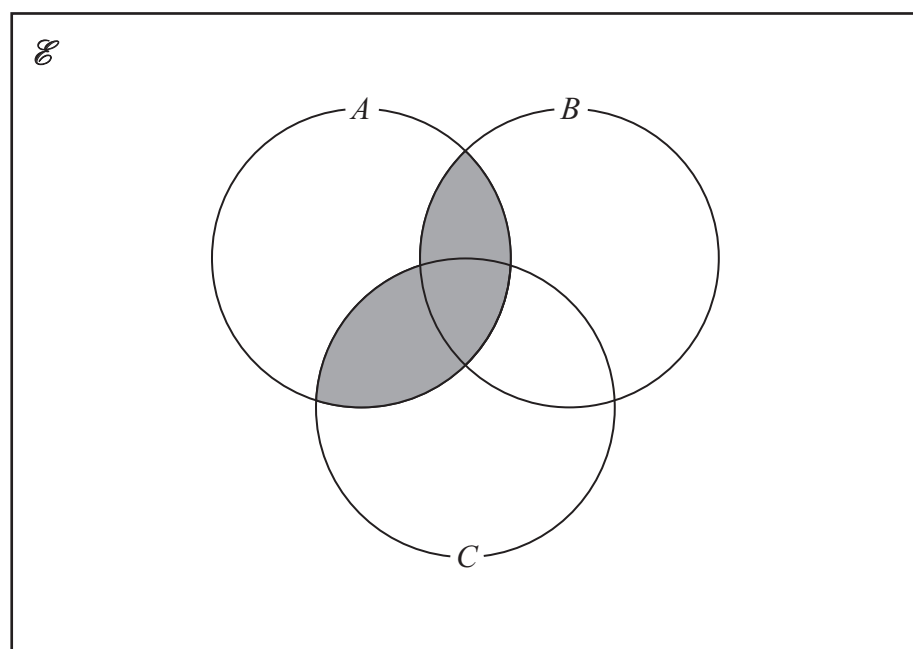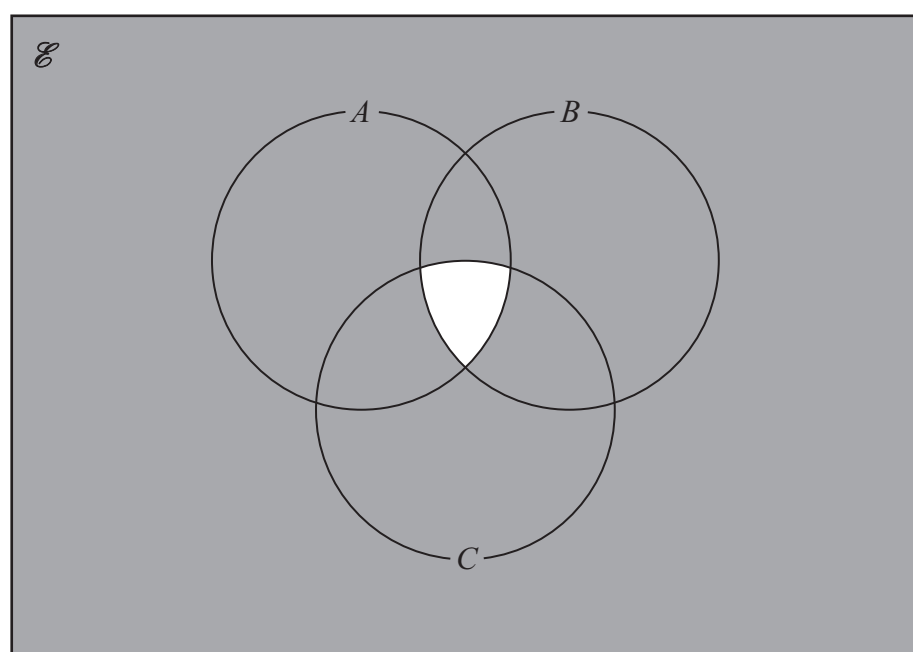
(a) Calculate the value of $\dfrac{x}{y}$. Give your answer in standard form.

....
(2)

(b) Express your answer to part (a) as a percentage.

....
(1)   Q9

(Total 3 marks)

10. Find the largest integer n which satisfies the inequality $5n + 1 < 3(n - 8)$

$n = $ Q10

(Total 3 marks)

11. The mean of $3x$, $(x - 4)$, $(3 - x)$, $4x$ and $(5x - 7)$ is 8
Find the value of x.

$x = $ Q11

(Total 3 marks)

12. $\mathbf{A} = \begin{pmatrix} -1 & 2 \\ 4 & 3 \end{pmatrix}$

Find

(a) $2\mathbf{A}$,

....
(1)

(b) $\mathbf{A}^2$.

....
(2)

(Total 3 marks)

13. A jar contains 20 coloured sweets of which x are red sweets.
A sweet is removed at random from the jar.

(a) Write down the probability that the sweet will be a red sweet.

....
(1)

A bowl contains 30 coloured sweets of which $(x + 10)$ are red sweets. The probability that a red sweet will be taken at random from this bowl is twice the probability that a red sweet will be taken at random from the jar.
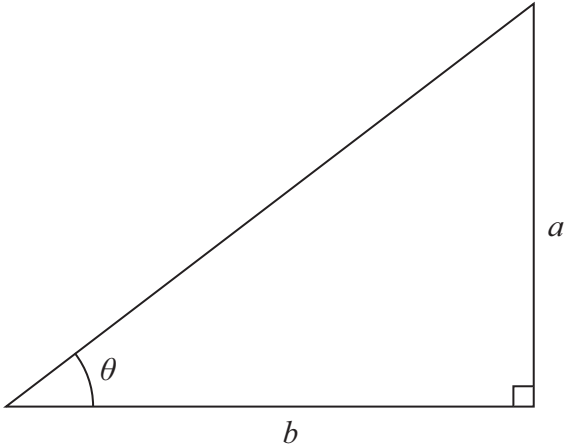
(b) Find the value of x.

....
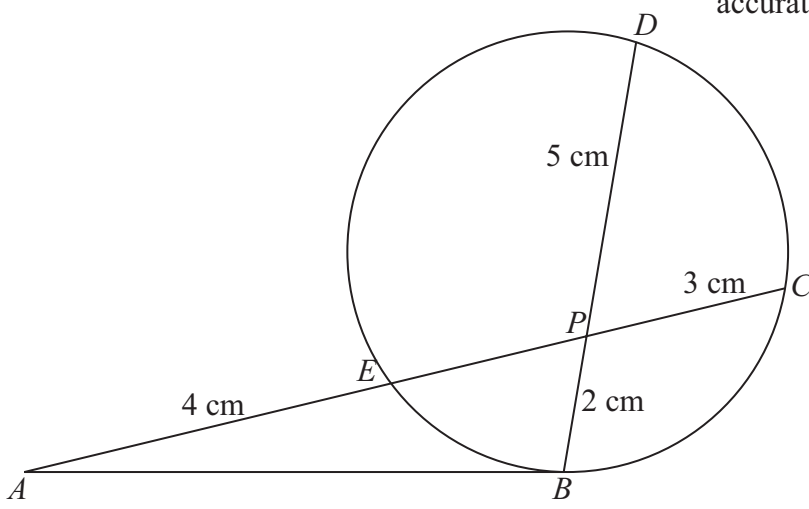**(2)**

(Total 3 marks)

Q12

Q13

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Turn over

N 3 6 6 5 6 A 0 7 2 0

14.

In the right-angled triangle, $\tan \theta = \dfrac{a}{b}$.

Find an expression in terms of a and b for $\sin \theta$.

....

(Total 3 marks)

15. Given that $\mathbf{a} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -3 \\ 8 \end{pmatrix}$, calculate the modulus of $3\mathbf{a} - \mathbf{b}$.

....

(Total 4 marks)

16. (a) Express a speed of 25 m/s in km/s.

....

(2)

(b) Express your answer to part (a) in km/h.

.....................................

(2)

(Total 4 marks)

17. s varies inversely as the square of t.

Given that $s = 20$ when $t = 4$, calculate, to 3 significant figures, the value of t when $s = 40$

$t = $ ....

(Total 4 marks)

18.

Diagram **NOT** accurately drawn

In the diagram, AB is the tangent at B to the circle $BCDE$.
The straight line AEC and the chord BD intersect at P.
$AE = 4$ cm, $DP = 5$ cm, $PB = 2$ cm and $CP = 3$ cm.
Calculate the length, in cm to 3 significant figures, of AB.

$AB = $ .... cm

(Total 4 marks)

19.

80 cm

30 cm

40 cm

Cylindrical pipe of
radius 5 cm
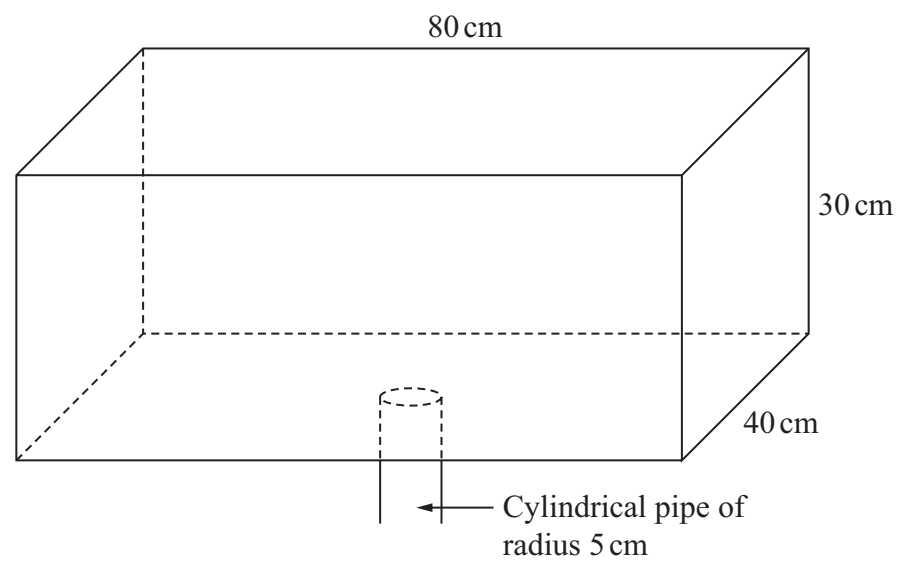
A tank in the shape of a cuboid measures 80 cm by 40 cm by 30 cm. The tank is completely full with water.

(a) Find the volume, in cm^3, of water in the tank.

....

(1)

Water flows out of the tank through a cylindrical pipe of radius 5 cm at a constant rate of 4 cm/s.

(b) Calculate the time, in seconds to the nearest second, taken to empty half of the water out of the tank.

....

(3)

(Total 4 marks)

20. Make x the subject of $y = \sqrt{\dfrac{2}{x} - 5}$

....

(Total 4 marks)

21. Solve $\dfrac{12}{x} = x + 1$

....

(Total 4 marks)

Turn over

N 3 6 6 5 6 A 0 1 1 2 0

22. Robert goes on holiday to France.
The exchange rate is £1 = 1.27 euros.

He changes £1250 into euros.

He spends 1200 euros while in France.
When he returns to England he changes the remaining euros back into £.
The exchange rate is now £1 = 1.14 euros.

Calculate how many £, to 2 decimal places, he receives.

£ ....

(Total 5 marks)

23. In a right-angled triangle, the length of the hypotenuse is $(5x + 16)$ cm.
The lengths of the other two sides are $(3x – 6)$ cm and $(4x + 20)$ cm.

(a) Find the value of x.

....
(3)

(b) Hence calculate the area, in cm², of the triangle.

....
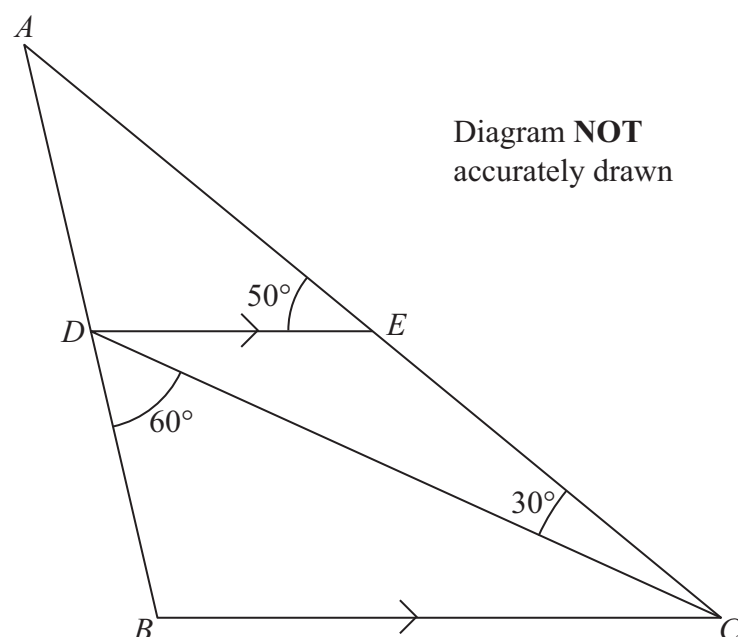**(2)**

(Total 5 marks)

24.

Diagram **NOT** accurately drawn

In the figure, *D* is a point on side *AB* and *E* is a point on side *AC* of $\triangle ABC$ such that *DE* and *BC* are parallel.
$\angle AED = 50°$, $\angle DCE = 30°$ and $\angle BDC = 60°$.

(a) Find, in degrees and giving your reasons, the size of $\angle BCD$.

....

(3)

(b) Show that triangle *ADC* is isosceles.

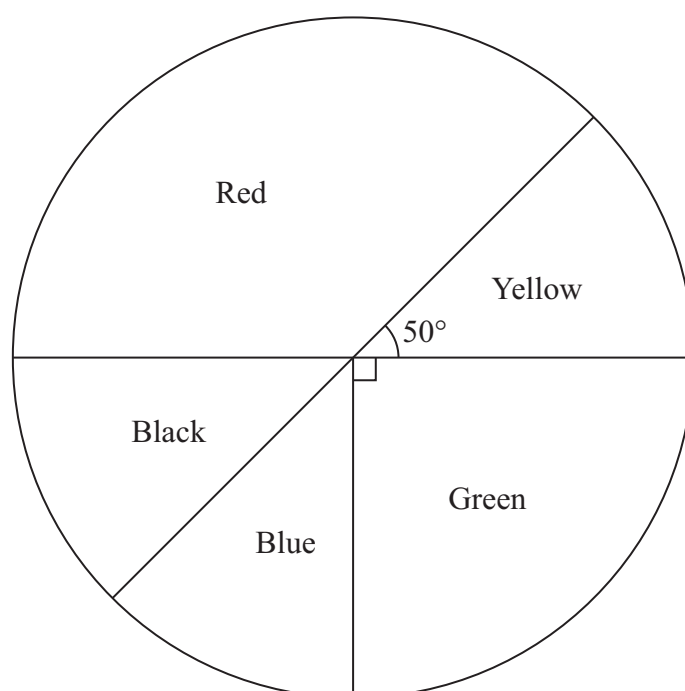......................................

(2)

(Total 5 marks)

Turn over

25.

Diagram **NOT** accurately drawn

A company has 180 cars to sell. The colours of the cars are red, yellow, green, blue and black. The pie chart shows information about the number of cars of each colour. The angle of the sector for yellow cars is 50° and the angle for green cars is 90°. There are as many yellow cars as there are black cars and the total number of black and blue cars is the same as the number of green cars.

(a) Write down the angle, in degrees, of the sector for

(i)   black cars,

....

(ii) blue cars,

....

(iii) red cars.

....
(3)

(b) Calculate the number of black cars.

....
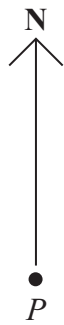**(2)**

(Total 5 marks)

N 3 6 6 5 6 A 0 1 4 2 0

26. A large box and a small box are similar.
The volume of the large box is 64 times the volume of the small box.

The height of the small box is 5 cm.

(a) Calculate the height, in cm, of the large box.

....
(3)

The total surface area of the large box is 480 cm^2.
(b) Calculate the total surface area, in cm^2, of the small box.

....
(2) **Q26**

(Total 5 marks)

27.

N

•
P

A ship travels 44 km from the point *P* on a bearing of 042° and then travels a further 60 km on a bearing of 090° to arrive at point *A*.

Using a scale of 1 cm to represent 10 km,

(a) draw accurately the path of the ship from *P* to *A* in the space above.
Label the point *A*.

(3)

A second port *Q* is on a bearing 080° from port *P* and on a bearing of 110° from point *A*.

(b) On the same diagram, locate the position of *Q*. Label the port *Q*.

(2)

(c) Write down the distance, in km, of port *Q* from port *P*.

....

(1)

(Total 6 marks)

Q27

28. (a) Differentiate $8 + 3x - x^2$ with respect to x.

....
(2)

$f(x) = 8 + 3x - x^2$

(b) Show that $f(x)$ has a maximum when $x = 1.5$

(2)

(c) Find the maximum value of $f(x)$

....
(2)

$g(x) = 6 + 3x - x^2$

(d) Write down the maximum value of $g(x)$.

....
(1)

(Total 7 marks)

TOTAL FOR PAPER: 100 MARKS

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