CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MATHEMATICS **6880/02**

Paper 2 Calculator Structured Questions (Core and Extended) **October/November 2012**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 90.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures.
Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

For Examiner's Use	
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This document consists of **15** printed pages and **1** blank page.

[Turn over

1 **(a)** You are given that, $f(x) = \dfrac{1}{2(3x-5)}$.

Find the values of

(i) f(2),

Answer (a)(i) ....[1]

(ii) f(−3).

Answer (a)(ii) ....[1]

(b) You are also given that $g(x) = 7x - 4$.

Find $g^{-1}(x)$.

Answer (b) ....[3]

2 A ship sails from port *A* to port *B* on a bearing of 065° for 140 km.
It then sails to port *C* on a bearing of 150° for 100 km.

(a) Using a scale of 1 cm to 20 km, draw the two stages of the journey.

N

A
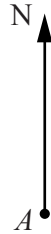
[3]

(b) Measure angle *ABC*.

Answer (b) ....° [1]

(c) Find the distance *AC* in kilometres.

Answer (c) ....km [2]

3
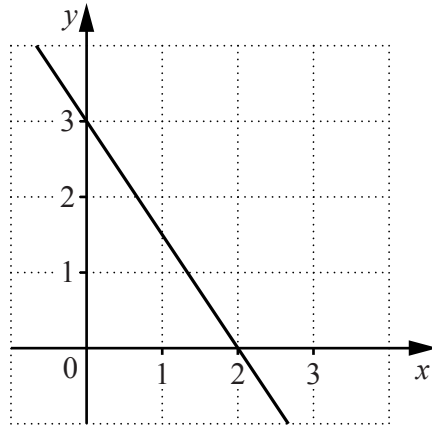
(a) Work out the gradient of the line.

Answer (a) ....[2]

(b) Write down the equation of the line.

Answer (b) ....[1]

4 A teacher's annual salary is E143 288.40.
His salary is taxed at 20%.

(a) How much tax does he pay per year?

Answer (a) E..[2]

(b) The teacher receives an increase in salary of 12%.

(i) What will be his new annual salary?

Answer (b)(i) E.....................................[2]

(ii) Calculate the teacher's new tax per year.

Answer (b)(ii) E.....................................[1]

(iii) The amount that remains after tax deduction is called a take-home salary.

Calculate the teacher's monthly take-home salary.

Answer (b)(iii) E.....................................[2]

5 **(a)** Write 1050 as a product of its prime factors.

Answer (a) ....[1]

(b) Given that $A = (2.5 \times 10^5)$, $B = (3.2 \times 10^4)$,
evaluate, giving your answers in standard form,

(i) AB,

Answer (b)(i) ....[1]

(ii) $\dfrac{B}{A}$,

Answer (b)(ii) ....[1]

(iii) $A - B$.

Answer (b)(iii) ....[1]

6   Solve the following equations.

   (a) $\dfrac{3x - 7}{5} = 4$

Answer (a) x = ...[2]

   (b) $x^2 + x - 6 = 0$

Answer (b) x = ... *or x =* .... [3]

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7   **(a)** Factorise each of the following.

   (i) $16x - 24$

Answer (a)(i) ....[1]

   (ii) $4p^2 - 1$

Answer (a)(ii) ....[1]

   (b) Simplify as far as possible

$$\frac{15x^4 y^2}{5x^2} \, .$$

Answer (b) ....[1]

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8 You are given that $A = \begin{pmatrix} 3 & 2 \\ x & 0 \end{pmatrix}$, $B = \begin{pmatrix} -1 & 4 \\ 5 & 2 \end{pmatrix}$ and $C = \begin{pmatrix} 7 & y \\ 1 & -4 \end{pmatrix}$.

   (a) Work out

     (i) B^2,

Answer (a)(i) ....[2]

     (ii) AB.

Answer (a)(ii) ....[2]

   (b) If $AB = C$, find the values of x and y.

Answer (b) x = ... *y =* ....[2]

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9 The longer side of a rectangle is 3 cm more than the shorter side.
The perimeter of the rectangle is 40 cm.
You are given that b is the length of the shorter side.

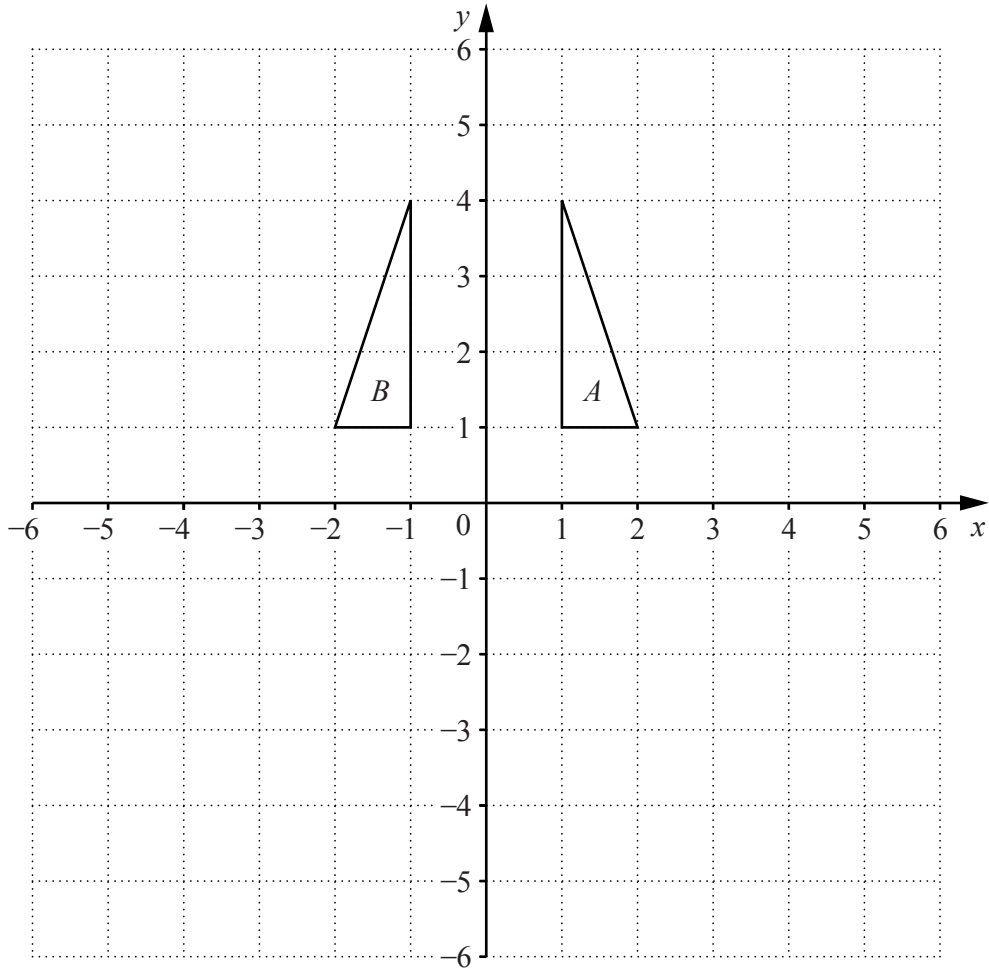   **(a)** Write an equation for the perimeter in terms of b.

Answer (a) ....[2]

   (b) Solve the equation to find the value of b.

Answer (b) b = ... cm [2]

10 On the grid below, triangles *A* and *B* have been drawn.
Triangle *A* has vertices $(1, 1)$, $(1, 4)$ and $(2, 1)$.
Triangle *B* has vertices $(-1, 1)$, $(-2, 1)$ and $(-1, 4)$.

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

....

....[2]

(b) (i) Draw the image of triangle *A* after a reflection on the line $y = -1$.
Label it *R*. [2]

(ii) Draw the image of *A* after a translation with vector $\begin{pmatrix} -3 \\ -4 \end{pmatrix}$.

Label it *T*. [2]

11 The distance between town A and town B is 100 km.
A bus leaves town A at 8.00 am and travels at a constant speed to reach town B at 10.30 am.

It stops for $1\frac{1}{2}$ hours at town B.

It then travels back to town A at a constant speed.
The bus travels at 50 km/h on the return journey.

(a) On the grid below draw a distance-time graph showing the journey of the bus.
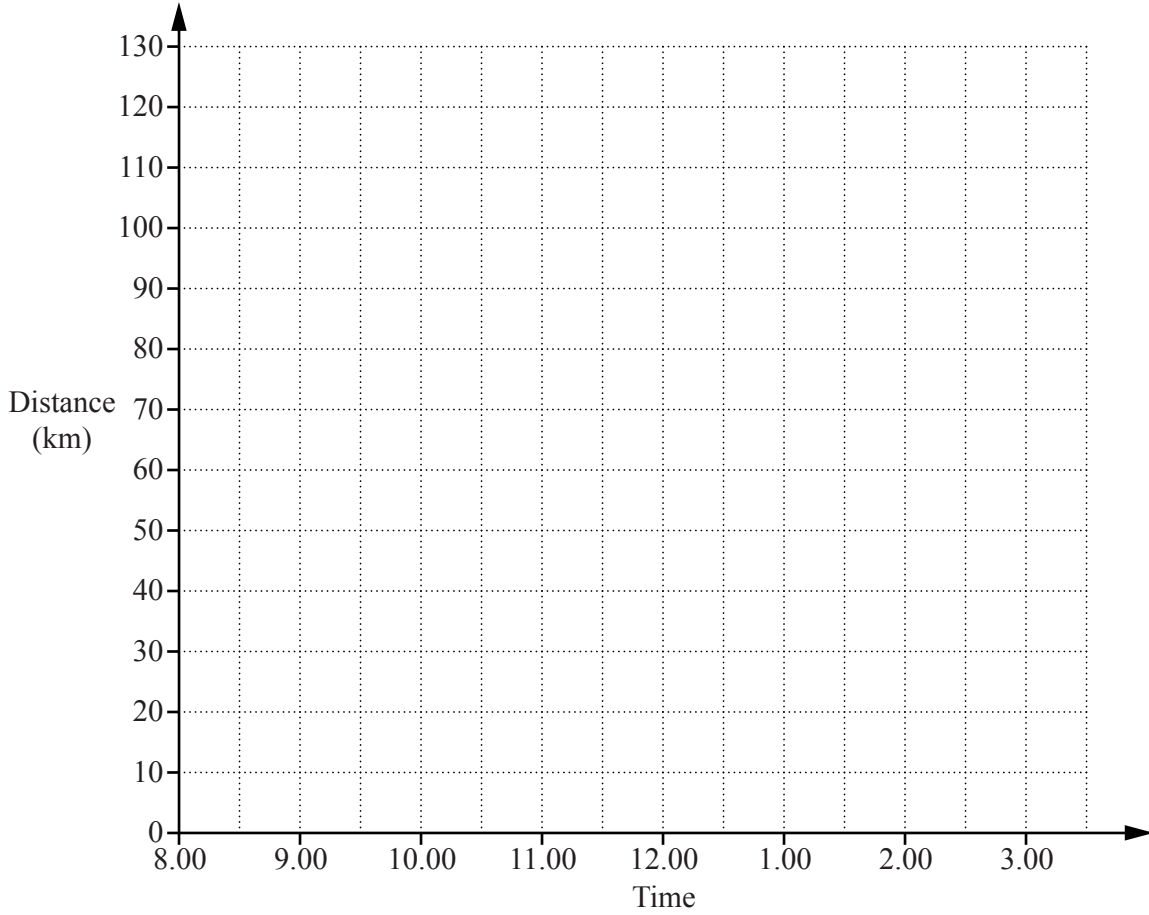
[3]

(b) At what time does the bus arrive back at town A?

Answer (b) ....[1]

12 The equation of the line passing through the points $(1, 4)$ and $(3, 8)$ is given by $ax + by = 2$.

(a) Write down two equations in terms of a and b.

Answer (a) ....

....[2]

(b) Solve the two equations to find the value of a and the value of b.

Answer (b) a = ...

b = ...[3]

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13 In a football stadium, $\frac{3}{7}$ of the people were female.

The total number of people who were in the stadium was 21000.

(a) How many males were in the stadium altogether?

Answer (a) ....[3]

In the football stadium the ratio of children to adults was $3:7$.

(b) Find the number of adults.

Answer (b) ....[2]

 [Turn over

14 A group of 40 pupils were asked to state the number of siblings (brothers and sisters) they had. The information is shown in the table below.

Number of siblings	0 – 2	3 – 5	6 – 8	9 – 11	12 – 14	15 – 17	18 – 20
Frequency	5	7	7	8	6	5	2

(a) On the grid below, draw a bar chart to show this information.
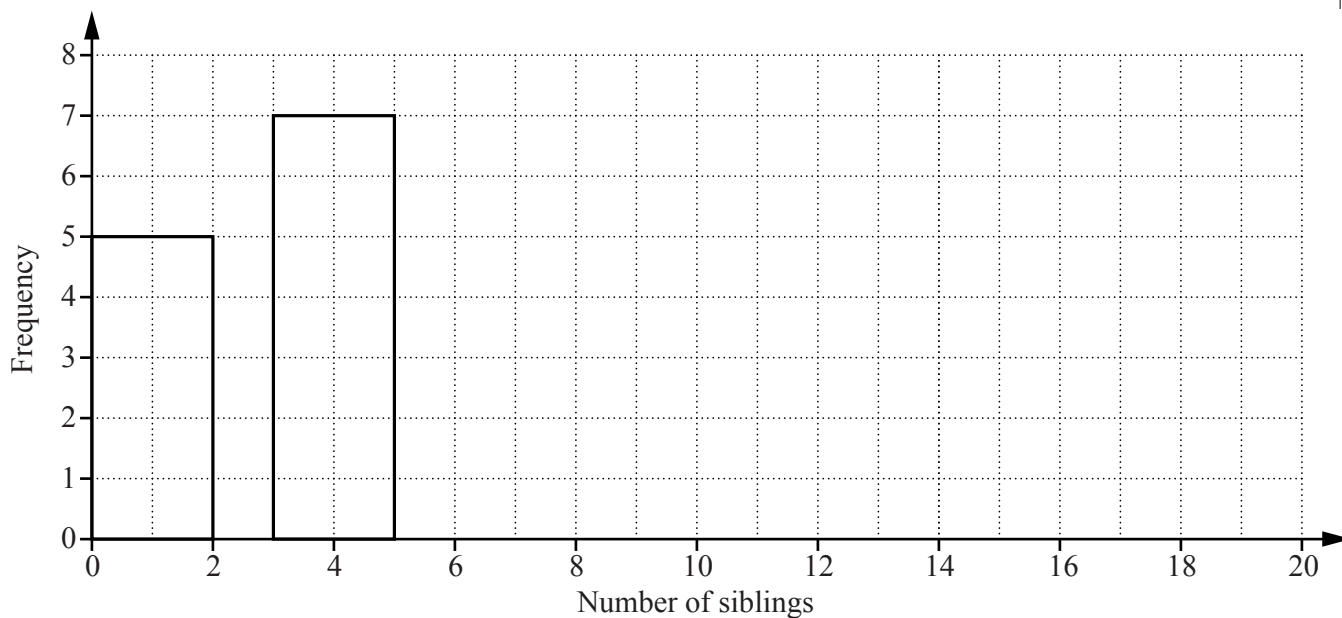
[3]

(b) What is the modal class of siblings?

Answer (b) ....[1]

(c) One of these pupils is selected at random.

Find the probability that this pupil has

(i) less than 12 siblings,

Answer (c)(i) ....[2]

(ii) 15 or more siblings.

Answer (c)(ii) ....[2]

15 The figure below shows a regular pentagon, *ABEFG*, and a rhombus, *BCDE*.
The points *A*, *B* and *C* lie on a straight line.
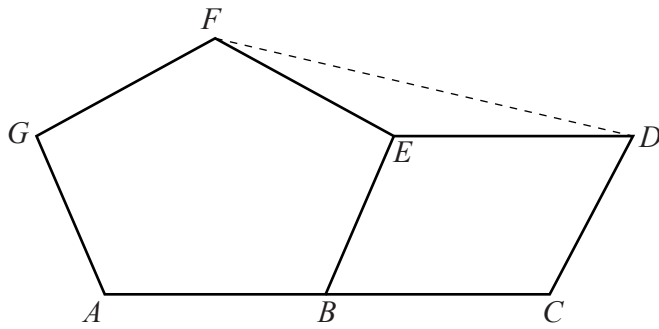
NOT TO SCALE

(a) Work out the size of each interior angle of the pentagon.

Answer (a) ....° [3]

(b) Find

(i) angle *BCD*,

Answer (b)(i) ....° [1]

(ii) angle *DEF*,

Answer (b)(ii) ....° [2]

(iii) angle *EDF*.

Answer (b)(iii) ....° [1]
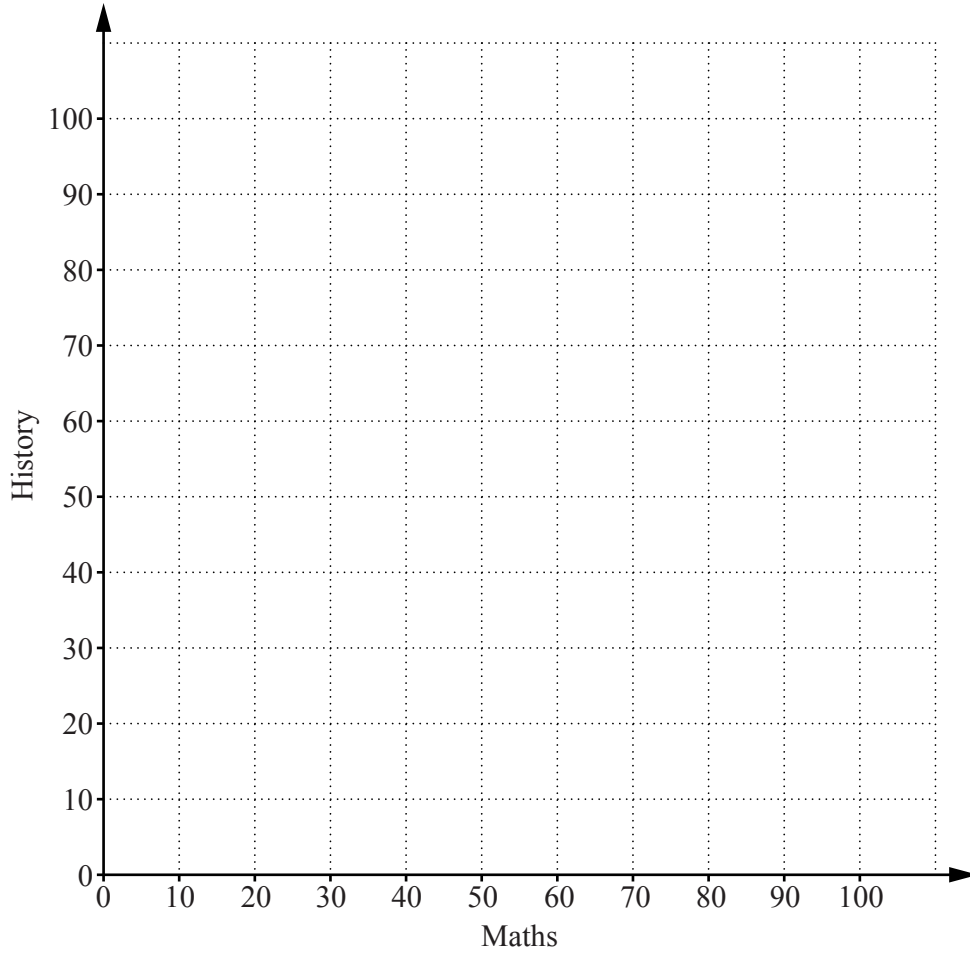
16 Ten pupils in a Form 5 class had the following marks for tests in Maths and History.

Student	A	B	C	D	E	F	G	H	I	J
Maths mark	30	60	40	100	35	45	90	75	90	50
History mark	95	70	80	25	80	90	30	40	10	50

(a) On the grid below plot the scatter diagram for these marks.

[3]

(b) State the type of correlation.

Answer (b) ....[1]
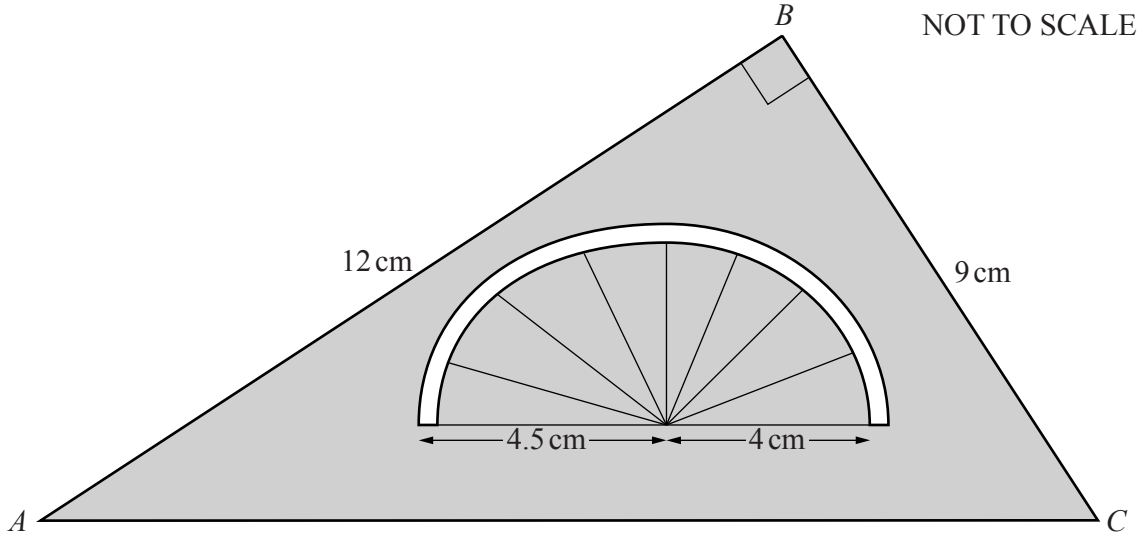
(c) Draw a line of best fit. [2]

17 The figure below represents a geometric instrument made from a set square *ABC* and a protractor.
The protractor has two semi-circles with the same centre.
The radius of the small semicircle is 4 cm.
The radius of the large semicircle is 4.5 cm.
AB = 12 cm and *BC* = 9 cm.

NOT TO SCALE

12 cm

9 cm

4.5 cm — 4 cm

A — *C*

The unshaded part is hollow.

(a) Calculate the area of the hollow part.

Answer (a) ....cm^2 [3]

(b) Hence find the area of the shaded part.

Answer (b) ....cm^2 [3]

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