OCR
RECOGNISING ACHIEVEMENT

GENERAL CERTIFICATE OF SECONDARY EDUCATION   **1962/3**

MATHEMATICS SYLLABUS A

PAPER 3 (Intermediate Tier)

THURSDAY 11 JANUARY 2007   Morning

Time: 2 hours

Candidates answer on the question paper.

Additional materials: Geometrical instruments
                         Tracing paper (optional)

Candidate Name	

Centre Number					

Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Show your working. Marks may be given for working that shows that you know how to solve the problem even if you get the answer wrong.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.

WARNING

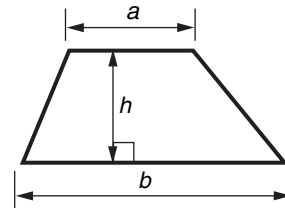**You are not allowed to use a calculator in this paper.**

For Examiner's Use

Formulae Sheet: Intermediate Tier

Area of trapezium $= \frac{1}{2}(a + b)h$

Volume of prism = (area of cross-section) $\times$ length

1 **(a)** Work out.

(i) $(6 + 9) \div 3$

....

(a)(i) _____[1]

(ii) $8 \times 2 + 3 \times 5$

....

(ii) _____[2]

(iii) $7 + 4 \times 4$

....

(iii) _____[1]

(b)   2   3   4   5   6   7   8   9

From the list of numbers above choose

(i) a prime number,

(b)(i) _____[1]

(ii) a cube number,

(ii) _____[1]

(iii) the value of $\frac{1}{0.5}$,

(iii) _____[1]

(iv) the value of n when $2^n = 16$.

....

....

(iv) _____[1]

[Turn over
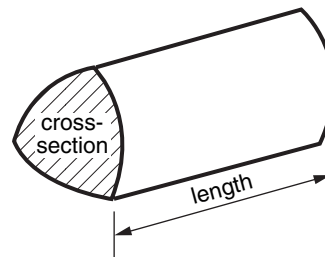
2   The diagram below shows the positions of two towns, Ashby (A) and Bidworth (B).
    The scale of the diagram is 1 cm to 4 km.

N

A

B
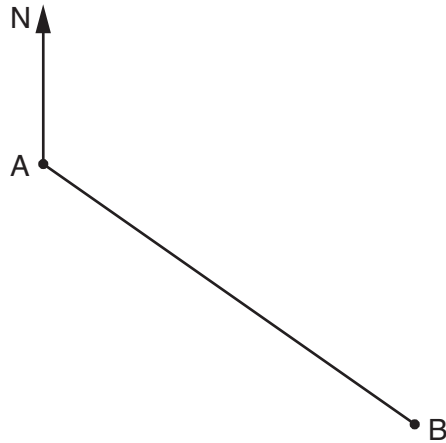
(a) What is the real distance from Ashby to Bidworth?

    ....

                                                                            (a) _____ km [2]

(b) What is the bearing of Bidworth from Ashby?

                                                                            (b) _____ ° [1]

3   (a) The first term of a number sequence is 3 and the term-to-term rule for the sequence is
        'add 4'.
        Find the fifth term of the sequence.

        ....

        ....

                                                                            (a) _____[2]

    (b) Here is a different number sequence.

                        8,   9,   11,   14,   18, ...

        (i) Find the next two terms of this sequence.

            ....

                                                                       (b)(i) _____ , _____[2]

        (ii) Explain how you worked these out.

            _____[1]

4 In the diagram, AB is parallel to CDE.
Angle BCD = 55° and angle BDE = 120°.

NOT TO SCALE
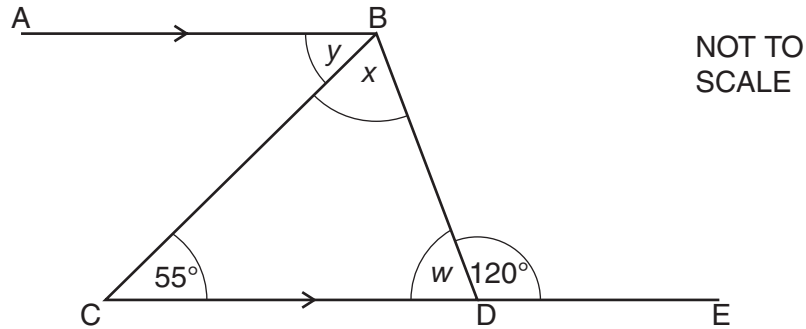
(a) Work out angle *w*.
Give a reason for your answer.

....

w = _____° because _____

_____[2]

(b) Work out angle *x*.
Give a reason for your answer.

x = _____° because _____

_____[2]

(c) Work out angle *y*.
Give a reason for your answer.

y = _____° because _____

_____[2]

_____

[Turn over

5 Mrs Brown kept a record of the average monthly temperature and the amount she spent on gas and electricity.
The table below shows her results for eight months.

Average temperature (°C)	4	7	10	12	15	22	24	28
Amount (£)	73	65	61	56	50	40	33	25

(a) Complete the scatter diagram below to show this information.
The first three points have been plotted for you.
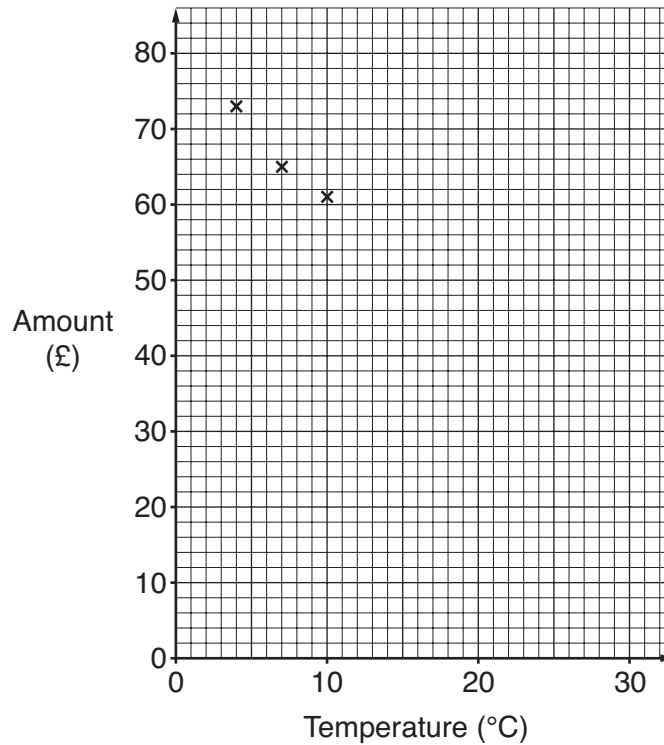
[2]

(b) Draw a line of best fit on your scatter diagram. [1]

(c) In another month the average temperature was 18 °C.
Use your line of best fit to estimate the amount Mrs Brown spent on gas and electricity in this month.

(c) £_____[1]

6 You are given that $123 \times 45 = 5535$.
Use this to help you work out the answer to each of the following.

(a) 12.3×4.5 = _____ [1]

(b) 1.23×4500 = _____ [1]

(c) $5535 \div 4.5$ = _____ [1]

....

....

....

7 This solid shape is made using seven centimetre cubes.
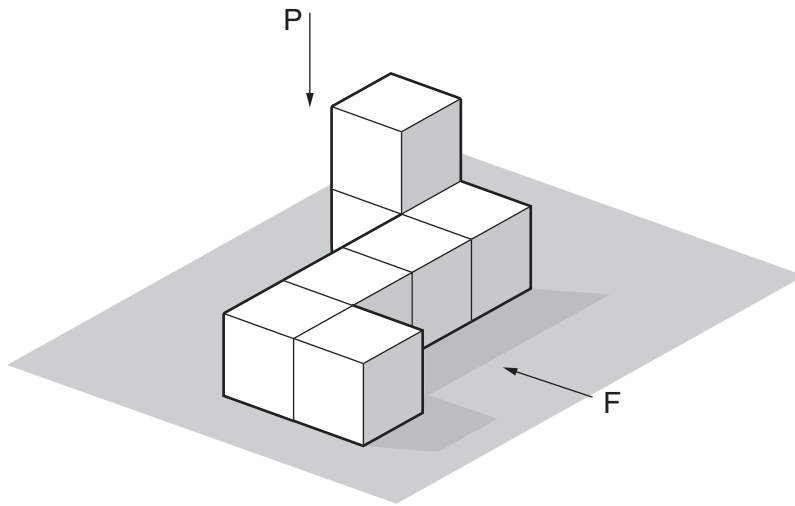
On the grids below, draw the front elevation and plan of this shape.
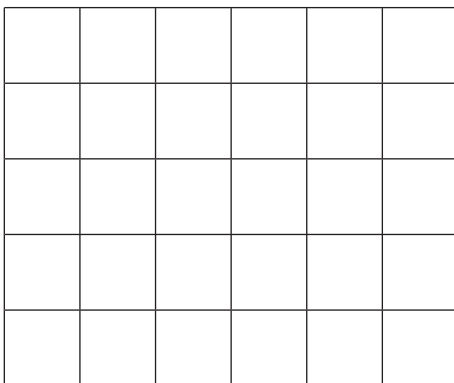
Front elevation
(view from F)

Plan
(view from P)

[4]

[Turn over
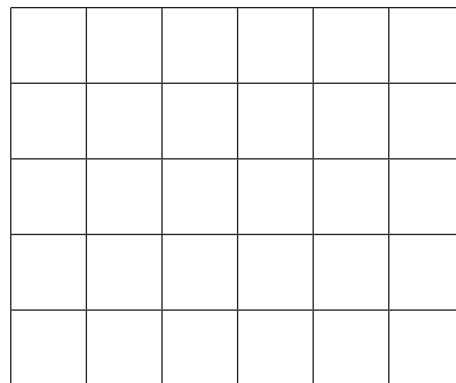
8 A box contains 7 red counters and 3 blue counters.

(a) A counter is taken from the box at random.
What is the probability that the counter is **blue**?

....

....

(a) _____[2]

(b) The counters are taken from the box and put into two bags.
Bag One contains 3 red and 2 blue.
Bag Two contains 4 red and 1 blue.
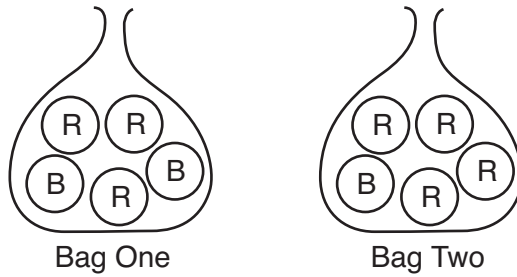
Bag One   Bag Two

Kim takes a counter from Bag One at random. She records its colour and then replaces it.
She does this 20 times.
Kim then takes a counter from Bag Two at random. She records its colour and then replaces
it. She also does this 20 times.

Altogether, how many times would you expect Kim to take a **red** counter?

....

....

....

....

....

....

....

....

(b) _____[4]

9 **(a)** Solve.

  (i) $\dfrac{x}{5} = 4$

  ....

  ....

  (a)(i) _____[1]

  (ii) $4(2x - 1) = 12$

  ....

  ....

  ....

  ....

  (ii) _____[3]

(b) Five students are solving this equation.

$$5x - 3 = 3x + 8$$

They each try to solve the equation in a different way.
Below is the first line of each of their solutions.

Under each of these put a tick (✔) if it is a correct first line or a cross (✗) if it is incorrect.

$2x = 11x$	$5x = 3x + 11$	$5x + 3x = 8 - 3$	$2x - 3 = 8$	$2x = 11$

  _____   _____   _____   _____   _____

  ....

  ....[2]

[Turn over

10 A group of Primary School children decide to make some buns and sell them to raise money for charity.

(a) They make Chocolate Cornflake Buns.
Here is the recipe.

> **Chocolate Cornflake Buns**
> **(enough for 15 buns)**
> 125 g of cornflakes
> one 50 g bar of chocolate

The children use 625 g of cornflakes.

(i) How many 50 g bars of chocolate do they use?

....

....

(a)(i) _____[1]

(ii) How many buns do they make?

....

....

(ii) _____[1]

(b) The usual price of the ingredients is £6.50.
As it was for charity, the shopkeeper allowed the children 20% discount.
How much did the children pay?

....

....

....

....

(b) £_____[3]

(c) The 625 g of cornflakes has been measured to the nearest gram.
What is the largest and smallest possible weight of the cornflakes?

(c) largest _____ g [1]

smallest _____ g [1]

(d) When the buns are sold, the children make a profit of £40.
They divide the profit between three charities in the ratio 5 : 3 : 2.
How much will each charity receive?

....

....

....

....

....

(d) £_____ , £_____ , £_____ [3]

11 **(a)** Simplify completely.

$$3a + 6b + 2a - 5b$$

....

....

(a) _____[2]

(b) Multiply out.

$$3(4 - 5x)$$

....

....

(b) _____[2]

(c) Rearrange the following formula to make t the subject.

$$v = 10t + 3$$

....

....

....

....

(c) $t =$ _____[2]

[Turn over

12 The diagram below shows two boundaries, AB and AC, of a park.

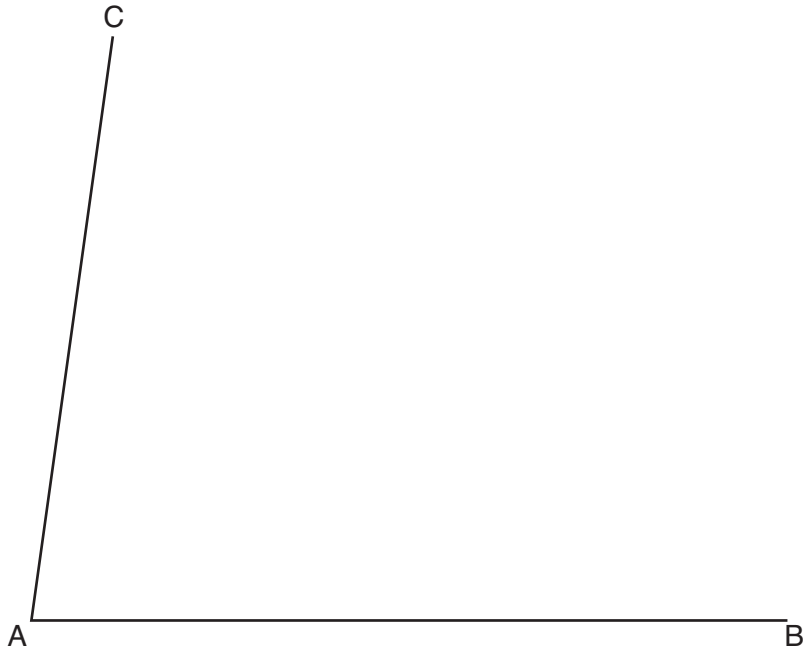There are two paths in the park.
One path is the bisector of angle CAB.
The second path is the perpendicular bisector of AB.

A signpost, S, is to be placed where the two paths cross.

Use ruler and compasses to construct lines showing the two paths.
Mark the position of the signpost, S.

C

A   B

[5]

13 (a) Complete the table of values for $y = 2x^2 - 3x$.

....

....

x	-1	0	1	2	3
y	5		-1	2	

[2]

(b) Draw the graph of $y = 2x^2 - 3x$.
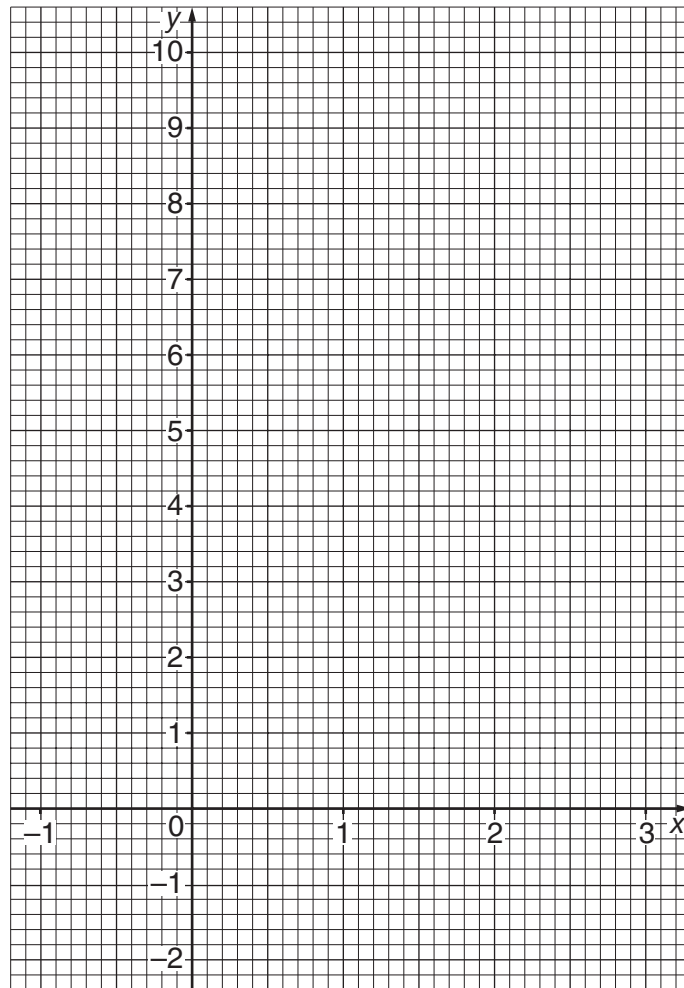
[2]

(c) Use your graph to solve the equation

$$2x^2 - 3x = 0.$$

(c) _____ [2]

[Turn over

14 Two maths classes take a test.
The scores for class 11A are summarised in the box plot below.
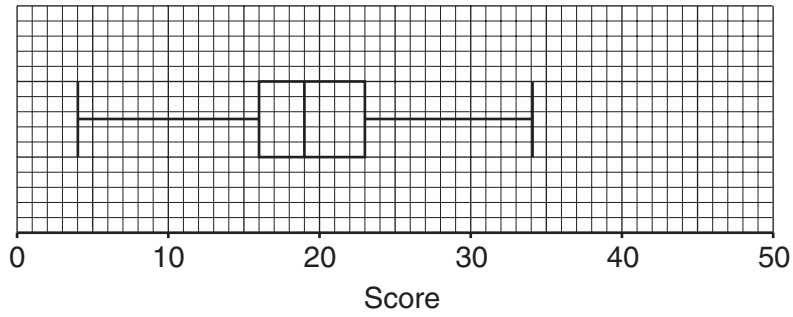
Score

(a) Work out the inter-quartile range of these scores.

....

....

(a) _____[1]

The scores for class 11B are summarised in the table below.

Lowest value	Lower quartile	Median	Upper quartile	Highest value
8	19	23	31	42

(b) On the grid below, draw the box plot for the scores of class 11B.
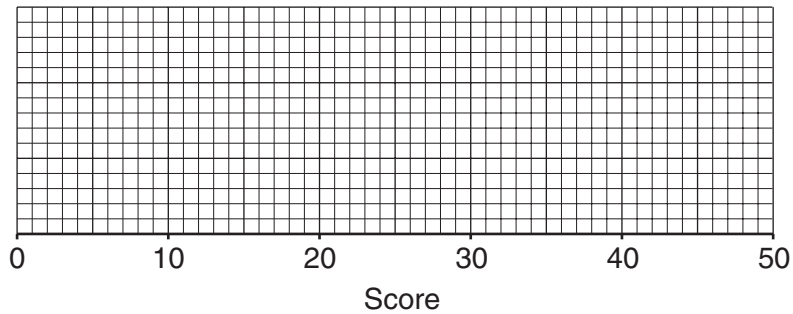
Score

[2]

(c) Make two different comparisons between the scores of the two classes.

(1) _____

_____

(2) _____

_____[2]

15
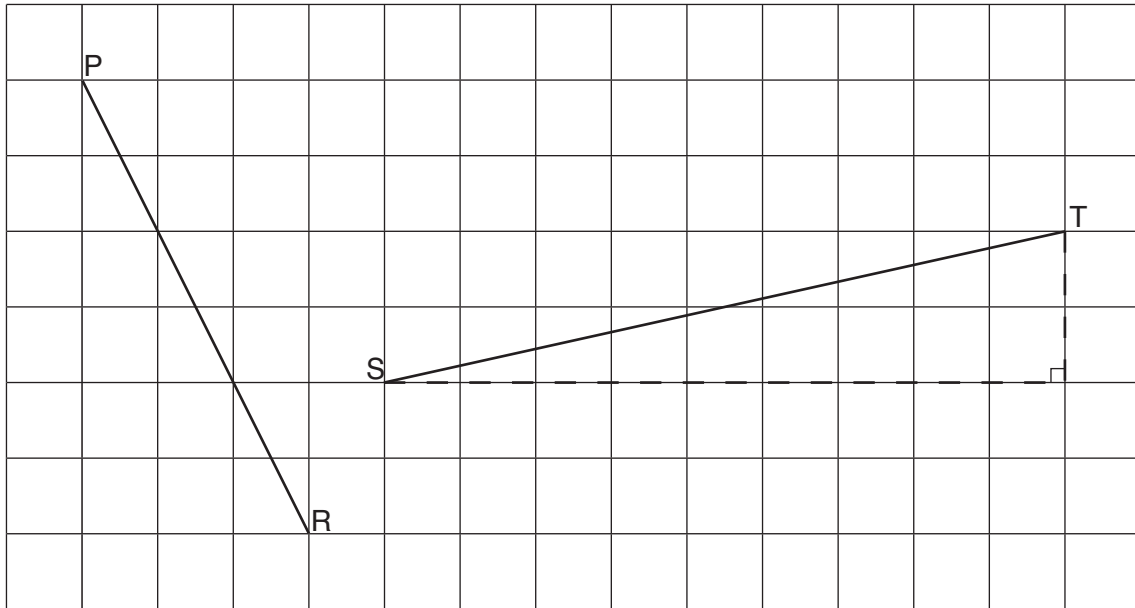
(a) Work out the gradient of the line PR.

....

....

....

....

(a) _____[3]

(b) **Work out** the length of the line ST.
Leave your answer as a square root.

....

....

....

....

....

....

(b) _____cm [3]

[Turn over

16 (a) (i) Factorise.

$$x^2 + 10x + 16$$

....

....

....

(a)(i) _____[2]

(ii) Hence solve.

$$x^2 + 10x + 16 = 0$$

....

....

(ii) _____[1]

(b) Solve these simultaneous equations algebraically.

$$2x + y = 4$$
$$4x + 3y = 6$$

....

....

....

....

....

....

....

....

(b) $x =$ _____ $y =$ _____ [3]

17 (a) (i) A company is sold for £22 million.
Write 22 million in standard form.

....

....

(a)(i) _____[1]

(ii) The density of Helium is 1.8×10^{-4} g/ml.
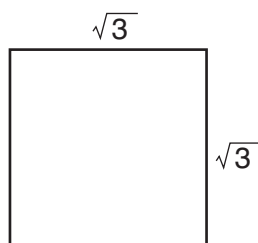Write 1.8×10^{-4} as an ordinary number.

....

....

(ii) _____[1]

(iii) Work out.

$$(4 \times 10^7) \times (8 \times 10^{-2})$$

Give your answer in standard form.

....

....

(iii) _____[2]

(b)

$\sqrt{3}$

$\sqrt{3}$

Work out the area and the perimeter of this square.
Write each answer in its simplest form.

....

....

....

....

....

(b)   Area = _____

Perimeter = _____[3]

[Turn over

18

NOT TO
SCALE

ABC is a triangle with angle ABC = 90°.
W, X and Y are points on AB, AC and CB respectively such that
angle XYC = angle AWX = 90°.

Prove that triangle CYX is similar to triangle XWA.
Give a reason for each step of your proof.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____[4]

_____

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