Edexcel GCSE

Mathematics A – 1387

Paper 6 (Calculator)

Higher Tier

Friday 14 November 2003 – Morning

Time: 2 hours

Materials required for examination	**Items included with question papers**
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser. Tracing paper may be used.	Formulae sheets

Instructions to Candidates

In the boxes on the answer book, write your centre number, candidate number, your surname and initials, the paper reference and your signature.
The paper reference is shown above. If more than one paper reference is shown, you should write the one for which you have been entered.
Answer **ALL** questions in the spaces provided in this book.
Supplementary answer sheets may be used.

Information for Candidates

The total mark for this paper is 100. The marks for the various parts of questions are shown in round brackets: e.g. **(2).**
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.
This paper has 21 questions.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper.
Do not spend too long on one question.
If you cannot answer a question leave it out and attempt the next one.
Return at the end to those you have left out.

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Use your calculator to work out the value of

$$\frac{(7.91 - \sqrt[3]{81}) \times 4.32}{6.23 + 1.491}$$

Give your answer correct to 3 significant figures.

....
(3)

2. A can of drink is in the shape of a cylinder.
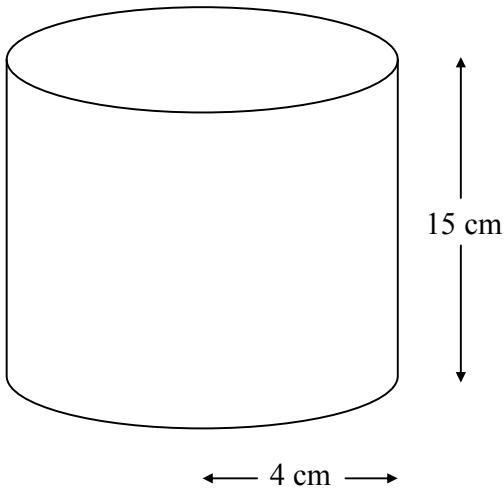The can has a radius of 4 cm and a height of 15 cm.

15 cm

Diagram **NOT**
accurately drawn

←— 4 cm —→

Calculate the volume of the cylinder.
Give your answer correct to 3 significant figures.

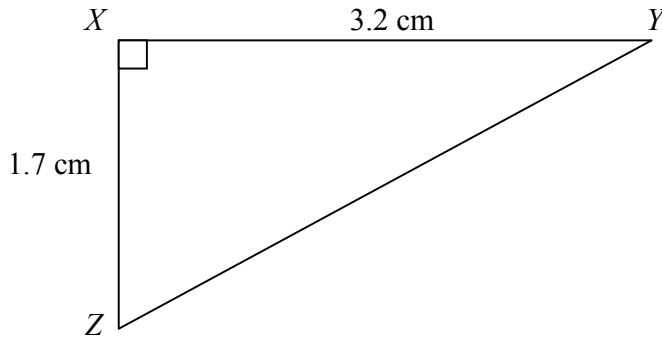...............................
(3)

3.

XYZ is a right-angled triangle.
XY = 3.2 cm.
XZ = 1.7 cm.

Calculate the length of *YZ*.
Give your answer correct to 3 significant figures.

.... cm

(3)

4. (a) Expand and simplify

$$3(2x - 1) - 2(2x - 3)$$

....

(2)

(b) Factorise

$$y^2 + y$$

....

(1)

5. Charles found out the length of reign of each of 41 kings.
He used the information to complete the frequency table.

Length of reign (L years)	Number of kings		
$0 < L \leq 10$	14		
$10 < L \leq 20$	13		
$20 < L \leq 30$	8		
$30 < L \leq 40$	4		
$40 < L \leq 50$	2		

(a) Write down the class interval that contains the median.

....

(2)

(b) Calculate an estimate for the mean length of reign.

.... years

(4)

6. A floppy disk can store 1 440 000 bytes of data.

(a) Write the number 1 440 000 in standard form.

....
(1)

A hard disk can store 2.4×10^9 bytes of data.

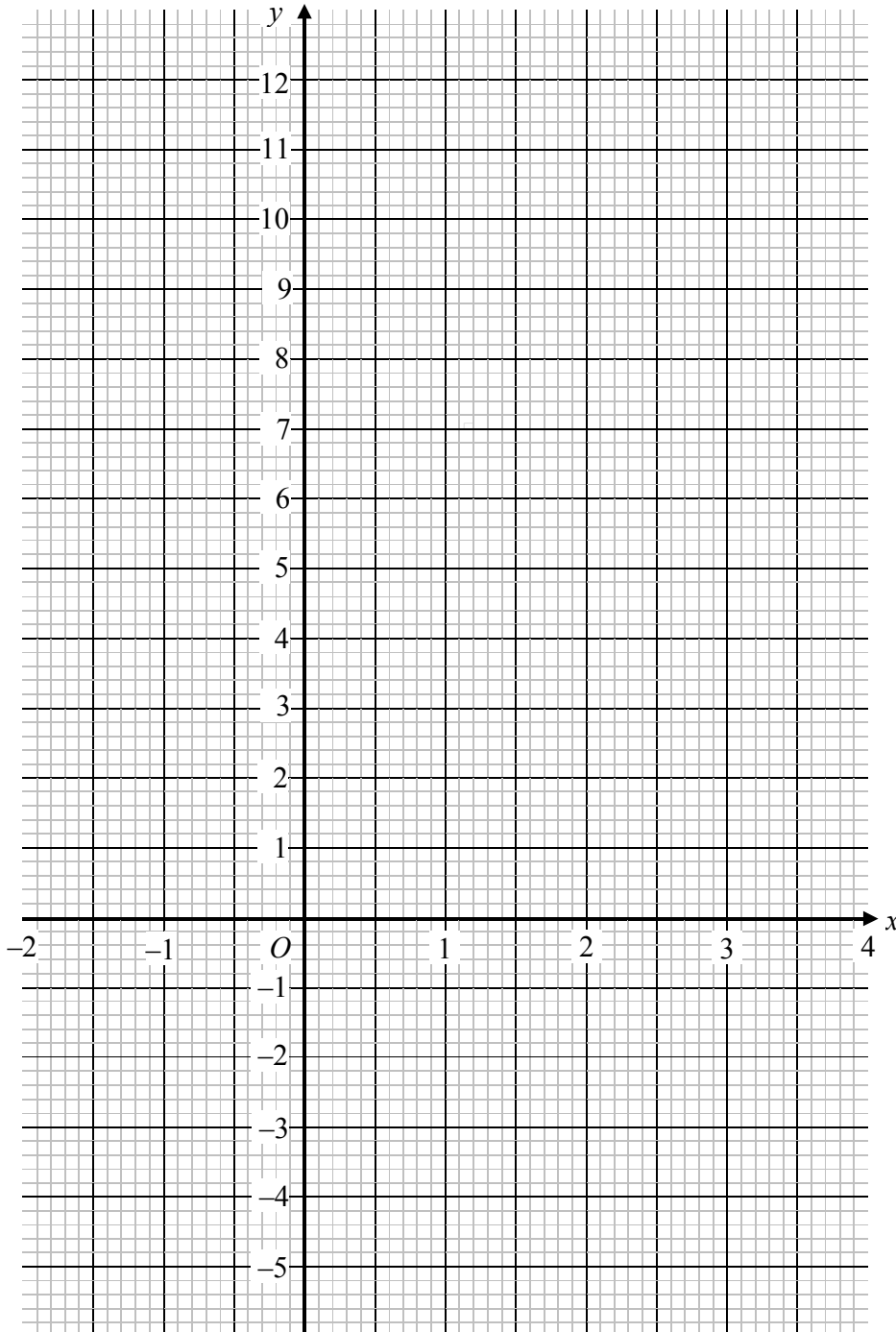(b) Calculate the number of floppy disks needed to store the 2.4×10^9 bytes of data.

....
(3)

7. (a) Complete the table for $y = x^2 - 3x + 1$

x	-2	-1	0	1	2	3	4
y	11		1	-1		1	5

(2)

(b) On the grid, draw the graph of $y = x^2 - 3x + 1$

(2)

(c) Use your graph to find an estimate for the minimum value of *y*.

$y =$ ....
(1)

(d) Use a graphical method to find estimates of the solutions to the equation

$$x^2 - 3x + 1 = 2x - 4$$

$x =$ .... or $x =$ ....
(3)

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8. (a) (i) Solve the inequality

$$5x - 7 < 2x - 1$$

....

(ii) On the number line, represent the solution set to part (i).
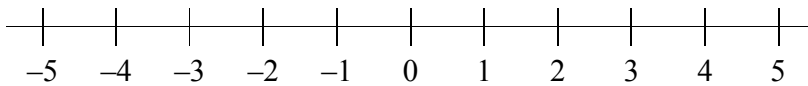
(3)

n is an integer such that $-4 \leq 2n < 3$.

(b) Write down the possible values of *n*.

....
(3)

9. The diagram represents a vertical flagpole, *AB*.
The flagpole is supported by two ropes, *BC* and *BD*, fixed to the horizontal ground at *C* and *D*.

Diagram **NOT** accurately drawn
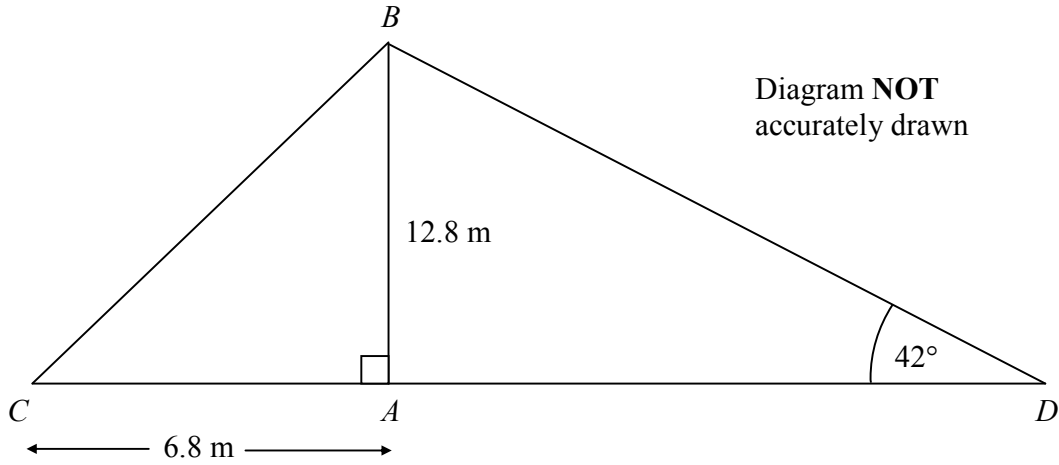
AB = 12.8 m.
AC = 6.8 m.
Angle *BDA* = 42°.

(a) Calculate the size of angle *BCA*.
Give your answer correct to 3 significant figures.

..............................°
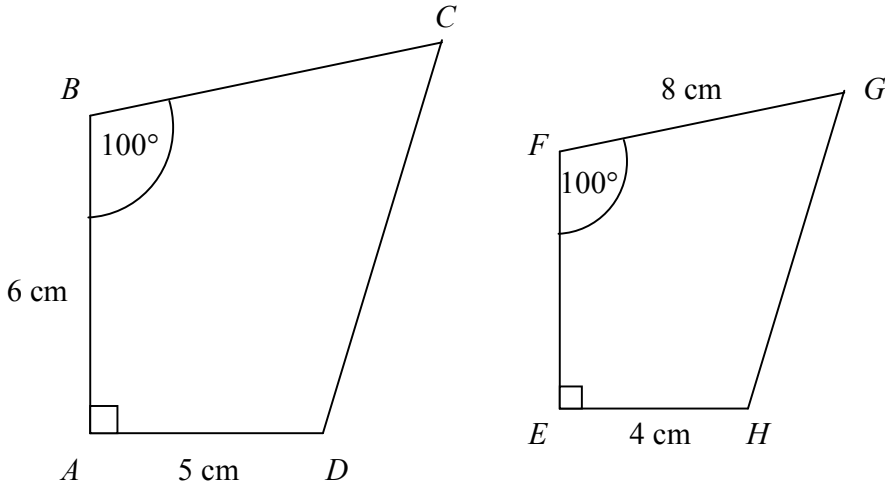
(3)

(b) Calculate the length of the rope *BD*.
Give your answer correct to 3 significant figures.

.... m

(3)

10.

Diagrams **NOT**
accurately drawn

Shapes *ABCD* and *EFGH* are mathematically similar.

(i) Calculate the length of *BC*.

BC = ………………… cm

(ii) Calculate the length of *EF*.

EF = ………………… cm

(5)

11. Solve the simultaneous equations

$$2x + 3y = -3$$

$$3x - 2y = 28$$

$x = $ …………………
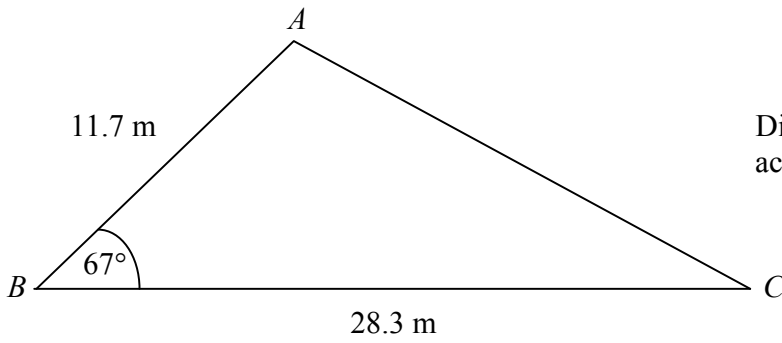
$y = $ …………………

(4)

12.

11.7 m

67°

B

28.3 m

A

C

Diagram **NOT** accurately drawn

AB = 11.7 m.
BC = 28.3 m.
Angle ABC = 67°.

(a) Calculate the area of the triangle ABC.
 Give your answer correct to 3 significant figures.

……………………………… m^2

(2)

(b) Calculate the length of AC.
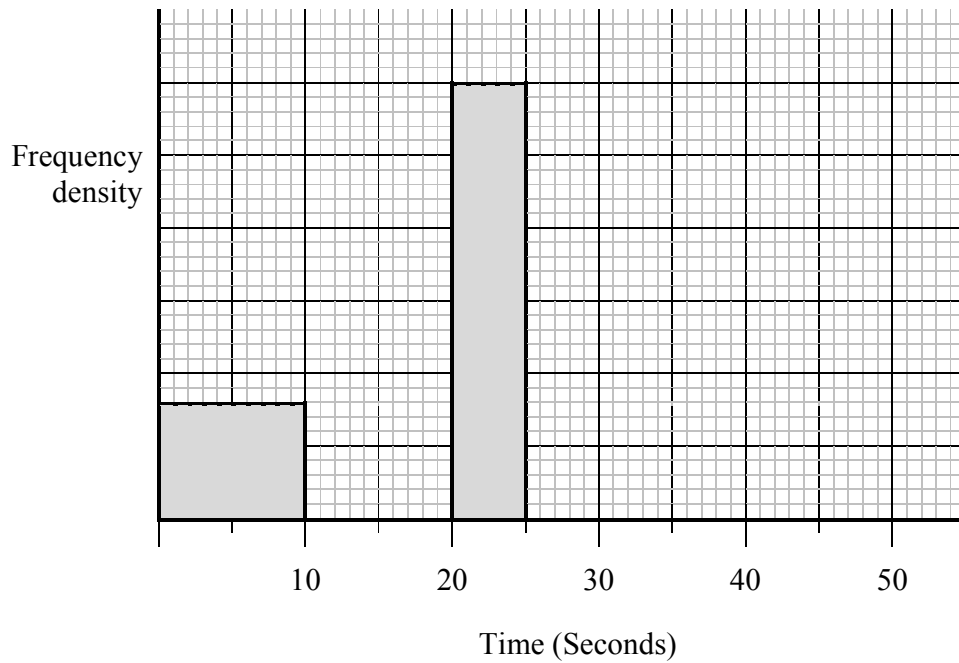 Give your answer correct to 3 significant figures.

…………………………. m

(3)

13. One Monday, Victoria measured the time, in seconds, that individual birds spent on her bird table.

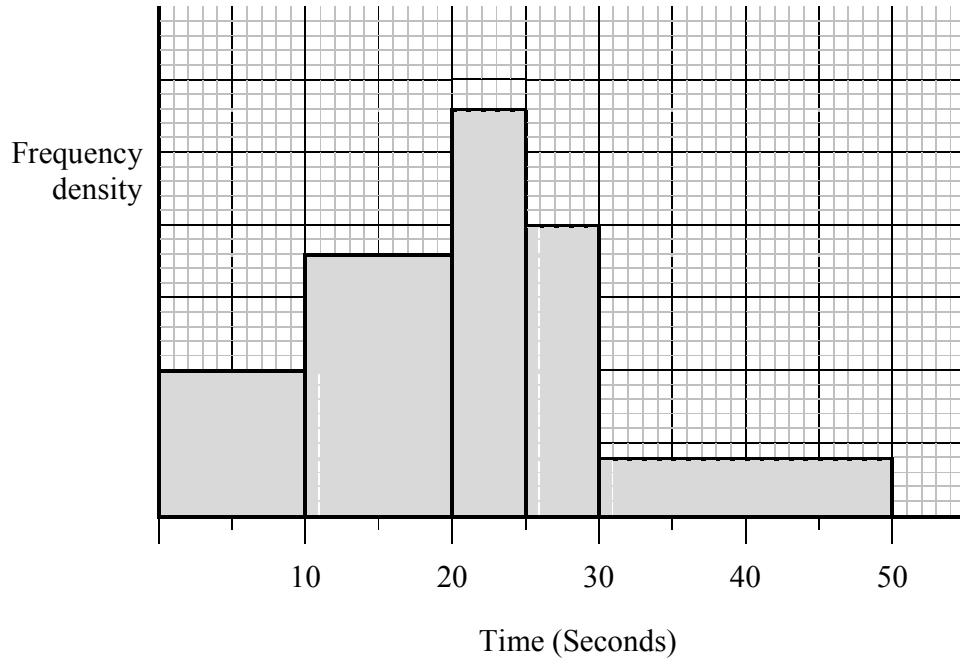She used this information to complete the frequency table.

Time (*t* seconds)	Frequency
$0 < t \le 10$	8
$10 < t \le 20$	16
$20 < t \le 25$	15
$25 < t \le 30$	12
$30 < t \le 50$	6

(a) Use the table to complete the histogram.

(3)

On Tuesday she conducted a similar survey and drew the following histogram from her results.

(b) Use the histogram for Tuesday to complete the table.

Time (t seconds)	Frequency
$0 < t \le 10$	10
$10 < t \le 20$	
$20 < t \le 25$	
$25 < t \le 30$	
$30 < t \le 50$	

(2)

14. Prove that,

$$(n + 1)^2 - (n - 1)^2$$

is a multiple of 4, for all positive integer values of n.

(3)

14

15. Two numbers have a difference of 15 and a product of 199.75

The larger of the two numbers is x.

(a) Show that

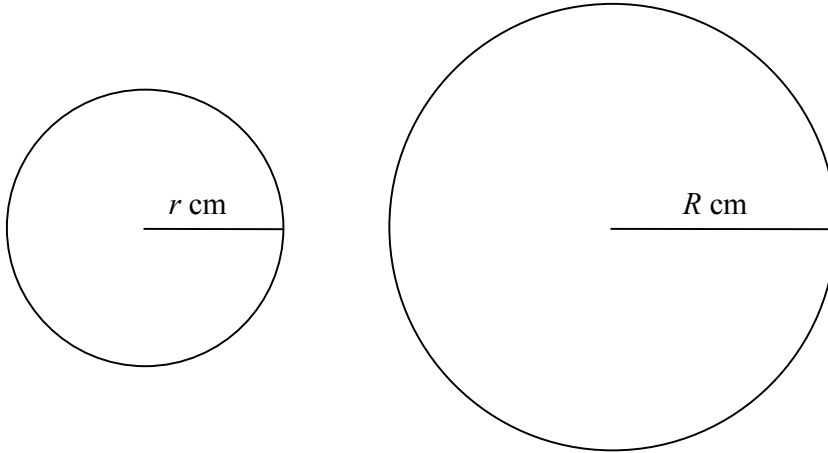$$x^2 - 15x - 199.75 = 0$$

(3)

(b) Solve the equation

$$x^2 - 15x - 199.75 = 0$$

....

(3)

16.

Diagram **NOT**
accurately drawn

The diagram represents two metal spheres of different sizes.

The radius of the smaller sphere is r cm.
The radius of the larger sphere is R cm.

$r = 1.7$ correct to 1 decimal place.

$R = 31.0$ correct to 3 significant figures.

(a) Write down the upper and lower bounds of r and R.

Upper bound of r = ……………………………

Lower bound of r = ……………………………

Upper bound of R = ……………………………

Lower bound of R = ……………………………

(2)

(b) Find the smallest possible value of $R - r$.

……………………………

(1)

The larger sphere of radius R cm was melted down and used to make smaller spheres of radius r cm.

(c) Calculate the smallest possible number of spheres that could be made.

....
(4)

17. (a) Factorise

$$9x^2 - 6x + 1$$

....
(2)

(b) Simplify

$$\frac{6x^2 + 7x - 3}{9x^2 - 6x + 1}$$

....
(3)

17

Turn over

18.
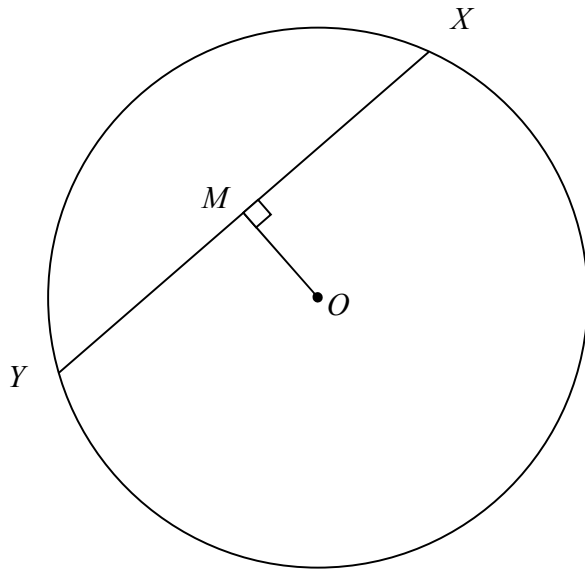
X and *Y* are points on the circle, centre *O*.
M is the point where the perpendicular from *O* meets the chord *XY*.

Prove that *M* is the midpoint of the chord *XY*.

(3)

19. Joan has two boxes of chocolates.
The boxes are labelled **A** and **B**.

Box **A** contains 15 chocolates. There are 6 plain, 4 milk and 5 white chocolates.
Box **B** contains 12 chocolates. There are 4 plain, 3 milk and 5 white chocolates.

Joan takes one chocolate at random from each box.
Work out the probability that the two chocolates Joan takes are not of the same type.

....

(4)

20. Solve the simultaneous equations

$$x^2 + y^2 = 29$$

$$y - x = 3$$

....

(7)

Turn over

21. The depth, *D* metres, of the water at the end of a jetty in the afternoon can be modelled by this formula

$$D = 5.5 + A \sin 30(t - k)°$$

where

t hours is the number of hours after midday,
A and *k* are constants.

Yesterday the low tide was at 3 p.m.
The depth of water at low tide was 3.5 m.

Find the value of *A* and *k*.

A = ………………………

k = ………………………

(4)

TOTAL FOR PAPER: 100 MARKS

END