Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.							5	5	0	6	/	0	6	Signature	

Paper Reference(s)

5506/06

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics A – 1387

Paper 6 (Calculator)

Higher Tier

Tuesday 15 June 2004 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
You must NOT write on the formulae page or any blank pages. Anything you write on these pages will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The total mark for this paper is 100. This paper has 22 questions.
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.

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 and attempt the next one.
Return at the end to those you have left out.

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Edexcel
Success through qualifications

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GCSE Mathematics 1387/8

Higher Tier Formulae

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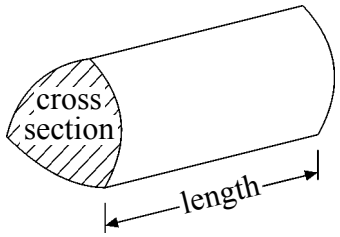
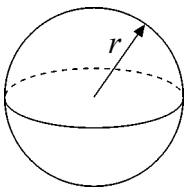
Anything you write on this page will gain NO credit.

Volume of a prism = area of cross section × length



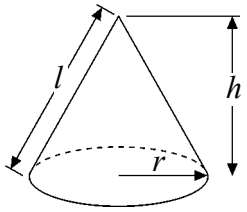
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$

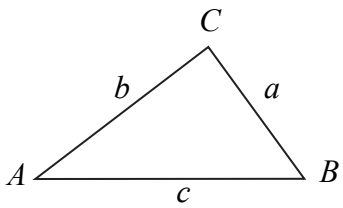


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



In any triangle ABC



Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Leave blank

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The manager of a school canteen has made some changes.
She wants to find out what students think of these changes.

She uses this question on a questionnaire.

"How much money do you normally spend in the canteen?"

☐	☐
A lot	Not much

Design a better question for the canteen manager to use.
You should include some response boxes.

(2)

Page Total

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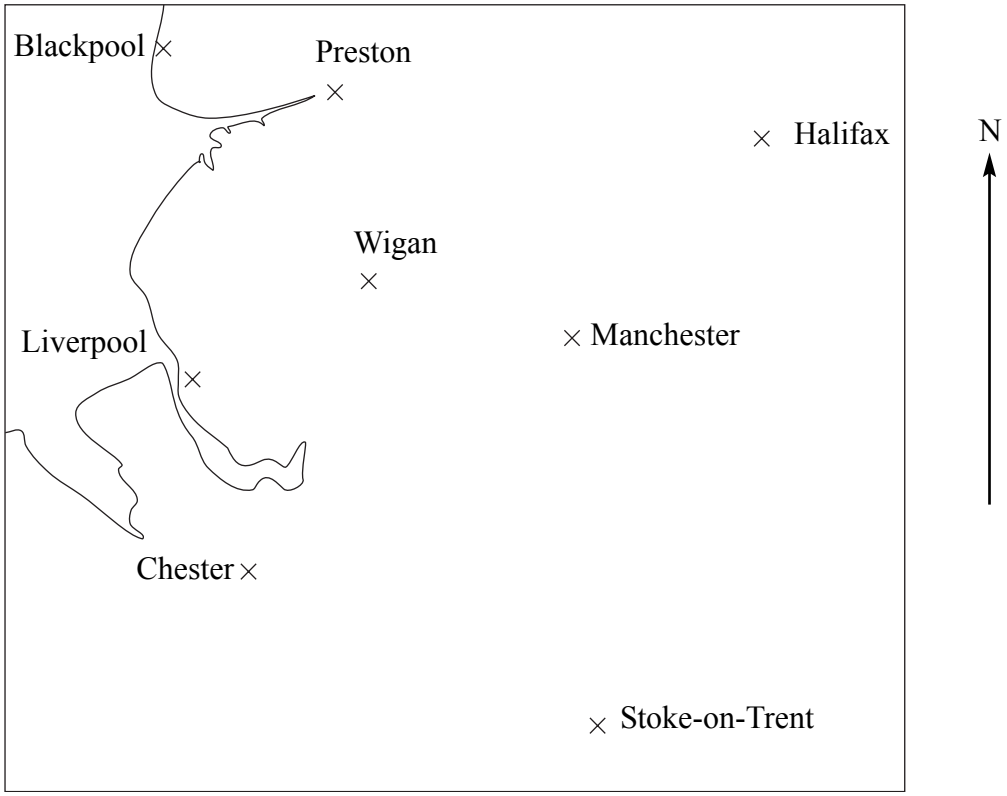
2. This is a map of part of Northern England.



Scale: 1 cm represents 10 km

A radio station in Manchester transmits programmes.
Its programmes can be received anywhere within a distance of 30 km.

On the diagram, shade the region in which the programmes can be received.

(2)

Leave blank

3. The table shows the number of computer games sold in a supermarket each month from January to June.

Jan	Feb	Mar	Apr	May	Jun
147	161	238	135	167	250

(a) Work out the three month moving averages for this information.

....

(2)

In a sale, a supermarket took 20% off its normal prices.
On Fun Friday, it took 30% off its sale prices.

Fred says, "That means there was 50% off the normal prices".

(b) Fred is wrong. Explain why.

(2)

Page Total

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4. The equation

$$x^3 - 2x = 67$$

has a solution between 4 and 5
Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **ALL** your working.

$x =$ .....
(4)

5. A nanosecond is 0.000 000 001 second.

(a) Write the number 0.000 000 001 in standard form.

.....
(1)

A computer does a calculation in 5 nanoseconds.

(b) How many of these calculations can the computer do in 1 second?
Give your answer in standard form.

.....
(2)

Leave blank

6. Use your calculator to work out the value of $\dfrac{6.27\times4.52}{4.81+9.63}$

(a) Write down all the figures on your calculator display.

.....

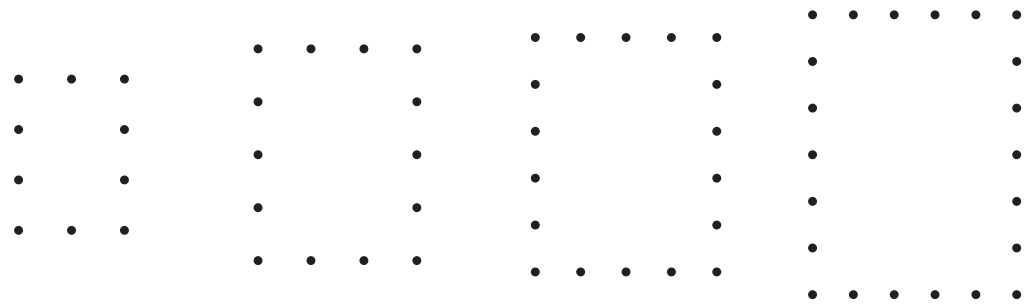
(2)

(b) Write your answer to part (a) to an appropriate degree of accuracy.

.....

(1)

7. Here are some patterns made from dots.



Pattern number 1 | Pattern number 2 | Pattern number 3 | Pattern number 4

Write down a formula for the number of dots, d, in terms of the Pattern number, n.

.....

(2)

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8.

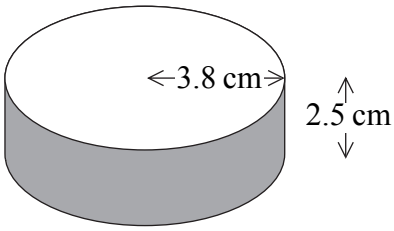

Diagram **NOT** accurately drawn

An ice hockey puck is in the shape of a cylinder with a radius of 3.8 cm, and a thickness of 2.5 cm.

It is made out of rubber with a density of 1.5 grams per cm^3.

Work out the mass of the ice hockey puck.
Give your answer correct to 3 significant figures.

..... grams

(4)

Leave blank

9.

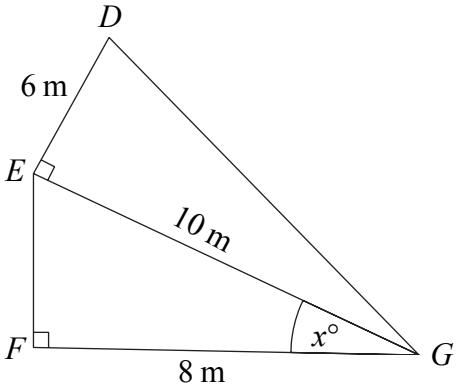

Diagram **NOT** accurately drawn

$DE = 6$ m.
$EG = 10$ m.
$FG = 8$ m.
Angle $DEG = 90°$. Angle $EFG = 90°$.

(a) Calculate the length of DG.
Give your answer correct to 3 significant figures.

..... m
(3)

(b) Calculate the size of the angle marked $x°$.
Give your answer correct to one decimal place.

°
.....
(3)

Page Total

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10. Solve the simultaneous equations

$$6x - 2y = 33$$

$$4x + 3y = 9$$

$x =$ .....

$y =$ .....

(4)

11.

Pictures **NOT** accurately drawn

A 20 Euro note is a rectangle 133 mm long and 72 mm wide.
A 500 Euro note is a rectangle 160 mm long and 82 mm wide.

Show that the two rectangles are **not** mathematically similar.

(3)

Leave blank

12. A company bought a van that had a value of £12 000
Each year the value of the van depreciates by 25%.

(a) Work out the value of the van at the end of three years.

£ .....
(3)

The company bought a new truck.
Each year the value of the truck depreciates by 20%.
The value of the new truck can be multiplied by a single number to find its value at the end of four years.

(b) Find this single number as a decimal.

.....
(2)

13. A cone has a volume of 10 m^3.

The vertical height of the cone is 1.5 m.

Calculate the radius of the base of the cone.
Give your answer correct to 3 significant figures.

..... m
(3)

Page Total

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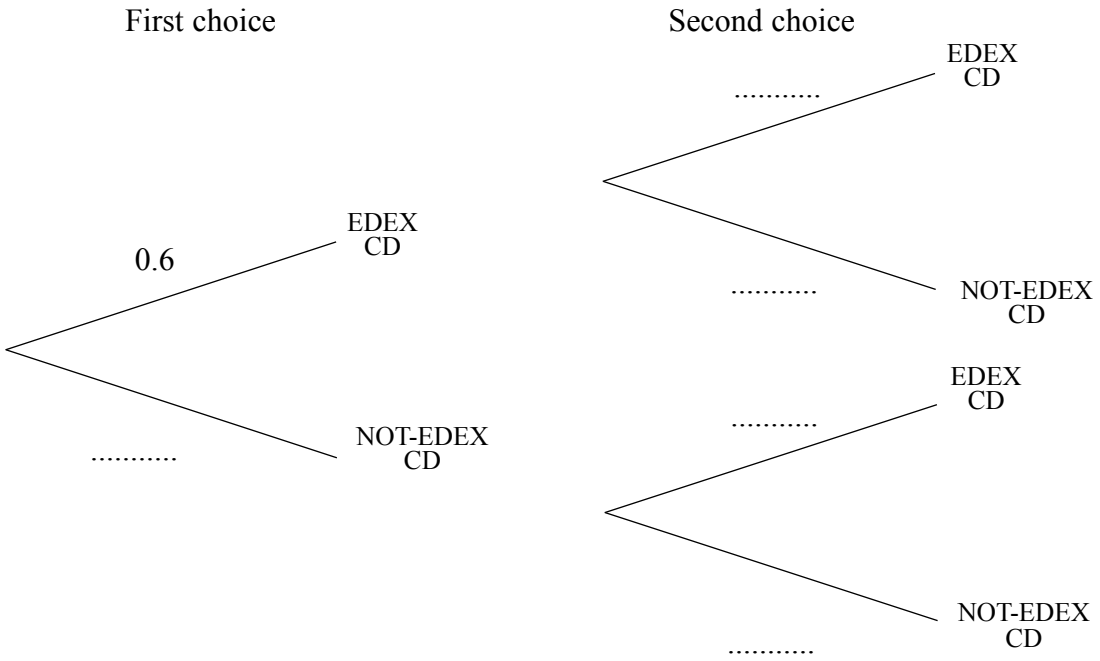
14. Amy has 10 CDs in a CD holder.
Amy's favourite group is Edex.
She has 6 Edex CDs in the CD holder.

Amy takes one of these 10 CDs at random.
She writes down whether or not it is an Edex CD.
She puts the CD back in the holder.
Amy again takes one of these 10 CDs at random.

(a) Complete the probability tree diagram.



(2)

(b) Find the probability that Amy will pick two Edex CDs.

.....

(2)

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Amy had 30 CDs.
The mean playing time of these 30 CDs was 42 minutes.

Amy sold 5 of her CDs.
The mean playing time of the 25 CDs left was 42.8 minutes.

(c) Calculate the mean playing time of the 5 CDs that Amy sold.

.....minutes
(3)

15. The shutter speed, S, of a camera varies inversely as the square of the aperture setting, f.

When $f = 8$, $S = 125$

(a) Find a formula for S in terms of f.

.....
(3)

(b) Hence, or otherwise, calculate the value of S when $f = 4$

$S =$ .....
(1)

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16.

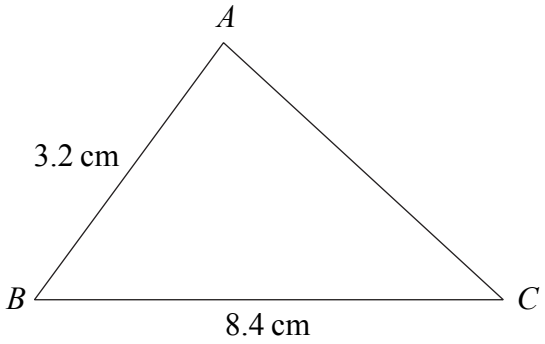

Diagram **NOT** accurately drawn

$AB = 3.2$ cm.
$BC = 8.4$ cm.

The area of triangle ABC is 10 cm^2.

Calculate the perimeter of triangle ABC.
Give your answer correct to three significant figures.

..... cm
(6)

Leave blank

17.

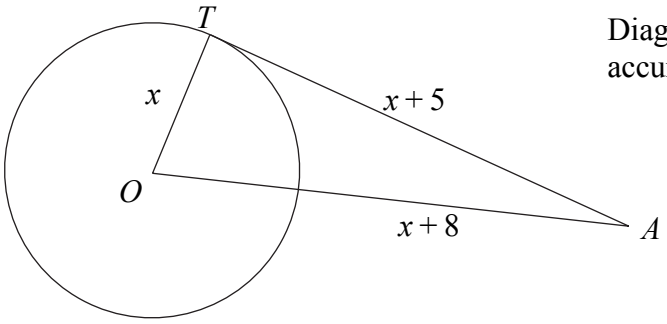

Diagram **NOT** accurately drawn

AT is a tangent at T to a circle, centre O.
$OT = x$ cm, $AT = (x + 5)$ cm, $OA = (x + 8)$ cm.

(a) Show that $x^2 - 6x - 39 = 0$

(4)

(b) Solve the equation $x^2 - 6x - 39 = 0$ to find the radius of the circle.
Give your answer correct to 3 significant figures.

..... cm

(3)

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18.

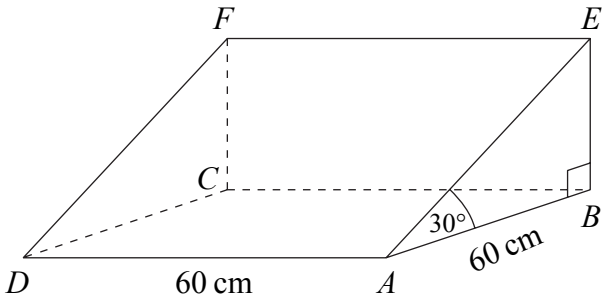

Diagram **NOT** accurately drawn

The diagram represents a prism.
AEFD is a rectangle.
ABCD is a square.
EB and *FC* are perpendicular to plane *ABCD*.

AB = 60 cm.
AD = 60 cm.
Angle *ABE* = 90°.
Angle *BAE* = 30°.

Calculate the size of the angle that the line *DE* makes with the plane *ABCD*.
Give your answer correct to 1 decimal place.

°

.....

(4)

Leave blank

19. Bill said that the line $y = 6$ cuts the curve $x^2 + y^2 = 25$ at two points.

(a) By eliminating y show that Bill is incorrect.

(2)

(b) By eliminating y, find the solutions to the simultaneous equations

$$x^2 + y^2 = 25$$

$$y = 2x - 2$$

$x =$ ..... $y =$ .....

or $x =$ ..... $y =$ .....

(6)

Page Total

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20. Martin won the 400 metre race in the school sports with a time of 1 minute.
The distance was correct to the nearest centimetre.
The time was correct to the nearest tenth of a second.

(a) Work out the upper bound and the lower bound of Martin's speed in km/h.
Give your answers correct to 5 significant figures.

Upper bound ..... km/h

Lower bound ..... km/h

(5)

(b) Write down an appropriate value for Martin's speed in km/h.
Explain your answer.

.....

.....

(1)

The table shows the number of people in each age group who watched the school sports.

Age group	0 – 16	17 – 29	30 – 44	45 – 59	60 +
Number of people	177	111	86	82	21

Martin did a survey of these people.
He used a stratified sample of exactly 50 people according to age group.

Leave blank

(c) Work out the number of people from each age group that should have been in his sample of 50.
Complete the table.

Age group	0 – 16	17 – 29	30 – 44	45 – 59	60 +	Total
Number of people in sample						

(3)

21. (a) Solve $\frac{40-x}{3} = 4+x$

$x =$ .....

(3)

(b) Simplify fully $\frac{4x^2-6x}{4x^2-9}$

.....

(3)

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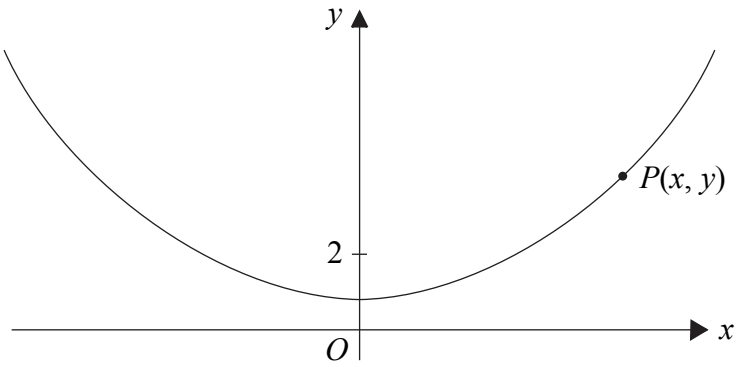
22.



The diagram shows a sketch of a curve.
The point $P(x, y)$ lies on the curve.
The locus of P has the following property:

The distance of the point P from the point (0, 2) is the same as the distance of the point P from the x-axis.

Show that $y = \frac{1}{4}x^2 + 1$

(4)

TOTAL FOR PAPER: 100 MARKS

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