Centre Number

Candidate Number

Edexcel GCSE

Methods in Mathematics
Unit 1: Methods 1
For Approved Pilot Centres ONLY

Higher Tier

Wednesday 16 November 2011 – Morning
Time: 1 hour 45 minutes

Paper Reference
5MM1H/01

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators must not be used**.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*****) are ones where the quality of your written communication will be assessed.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

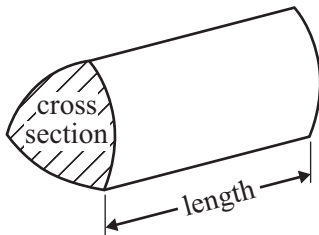P40115A
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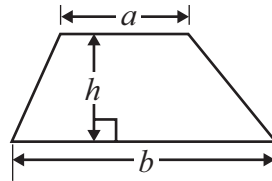
**You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.**

Volume of prism = area of cross section × length
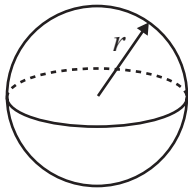

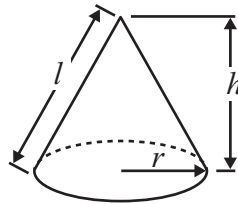**Area of trapezium** $= \frac{1}{2}(a + b)h$

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 $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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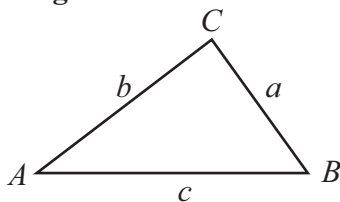
The Quadratic Equation

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

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

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1

20 cm

40 cm

35 cm

10 cm
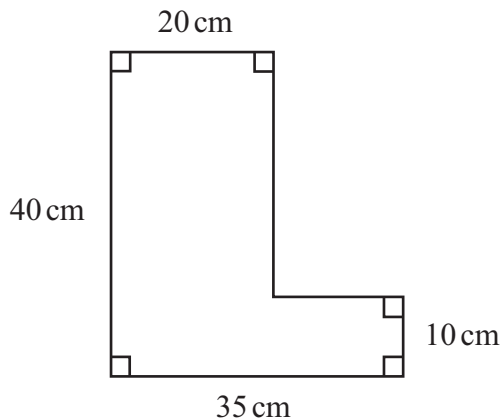
Diagram **NOT**
accurately drawn

Work out the perimeter of this shape.

....cm

(Total for Question 1 is 2 marks)

2   Given that $103.7 \times 17.5 = 1814.75$

write down the value of

(i) 10.37×1.75

....

(ii) $1.037 \times 17\,500$

....

(iii) $181.475 \div 175$

....

(Total for Question 2 is 3 marks)

3 (a) Write 126 as a product of its prime factors.

....
(2)

(b) Find the Highest Common Factor (HCF) of 126 and 70

....
(2)

(c) Work out the Lowest Common Multiple (LCM) of 126 and 70

....
(2)

(Total for Question 3 is 6 marks)

4 A bag contains only red counters and blue counters.
There are 4 red counters in the bag.

The probability of taking a blue counter is the same as the probability of taking a red counter.

(a) How many blue counters are there in the bag?

....

(1)

In another bag there are 14 counters.
The bag contains only red counters, blue counters and yellow counters.
4 of the counters are red.

The probability of taking a blue counter is twice the probability of taking a red counter.
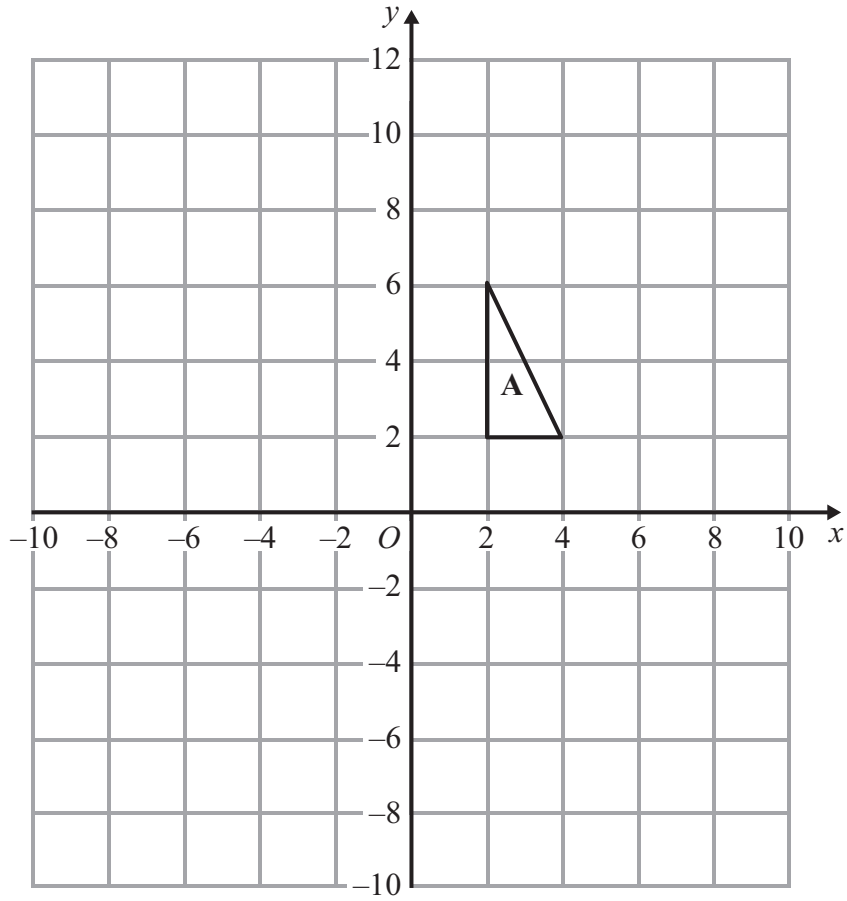
(b) How many yellow counters are there in the bag?

....

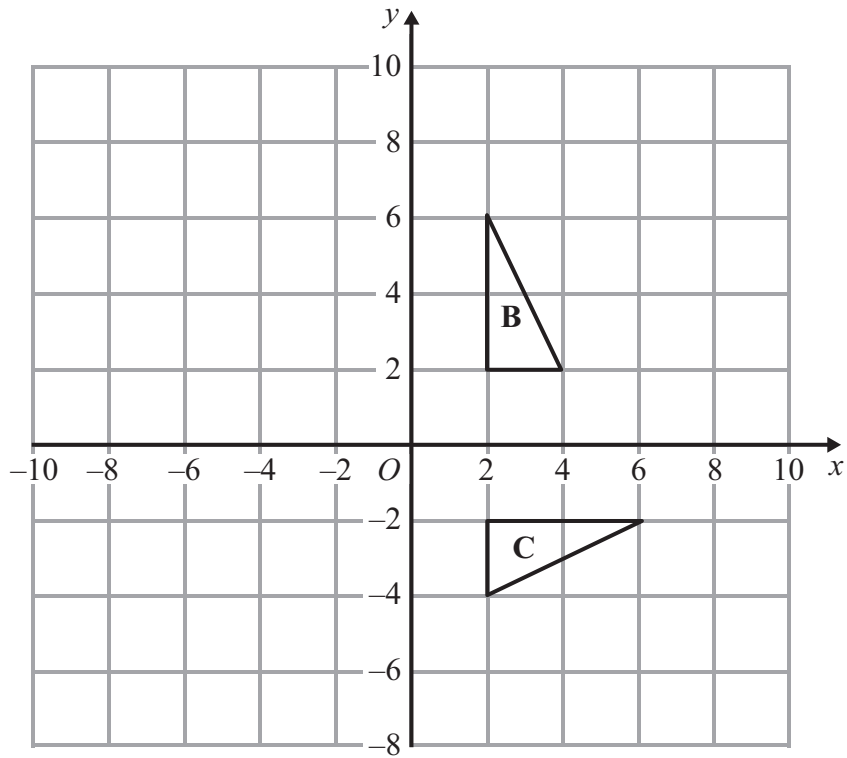**(3)**

(Total for Question 4 is 4 marks)

5

(a) Enlarge triangle **A**, with scale factor 2, centre (2, 2).

(2)

(b) Describe fully the single transformation that maps triangle **B** onto triangle **C**.

....

....

(3)
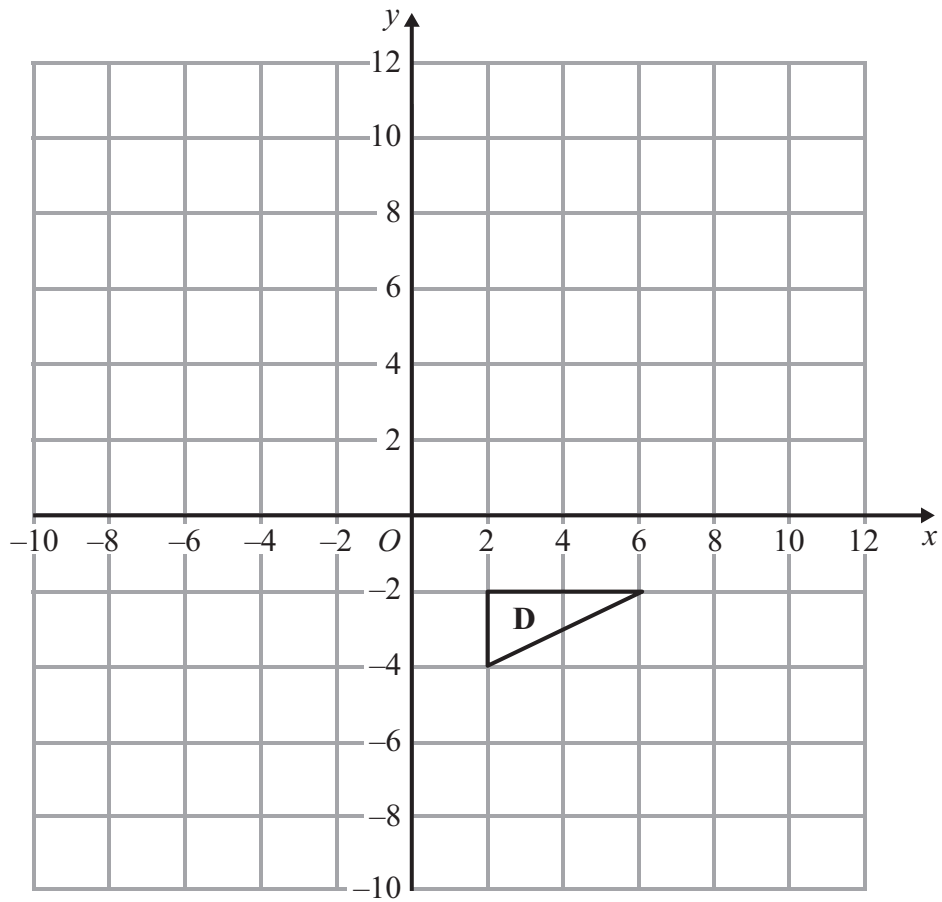
(c) Translate triangle **D** by $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$.

(2)

(Total for Question 5 is 7 marks)

6 Savio has two fair dice.
He throws the two dice and adds the scores together.

(i) What is the probability of getting a total of exactly 11?

....

Savio says,

" The probability of getting a total of 5 or more is $\frac{3}{4}$ "

*(ii) Is Savio correct?
You must show your working.

(Total for Question 6 is 6 marks)

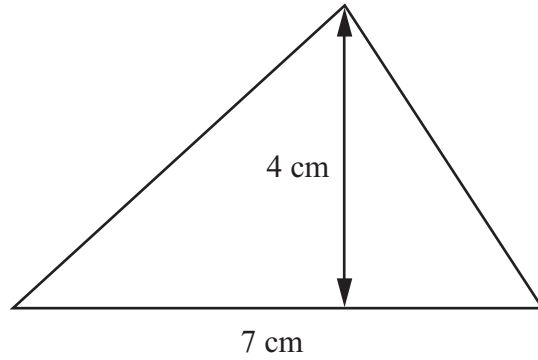*Turn over* ▶

7 Here is a triangle.

Diagram **NOT** accurately drawn

4 cm

7 cm

The height of the triangle is 4 cm.
The base of the triangle is 7 cm.

(a) Work out the area of the triangle.

....cm²
(2)

(b) Work out the length and the width of a rectangle that has the same area as this triangle.

length ....cm

width ....cm
(2)

(Total for Question 7 is 4 marks)

8 A pizza shop sells eight types of pizzas.

This table gives information about the first 40 pizzas sold one evening.

Type of Pizza	Total
Margherita	8
Hawaiian	9
4 cheeses	4
Chicken	7
Vegetarian	8
Pepperoni	3
Farmhouse	0
Seafood	1

Using this information

(i) find an estimate for the probability that the next pizza sold will be a Margherita pizza,
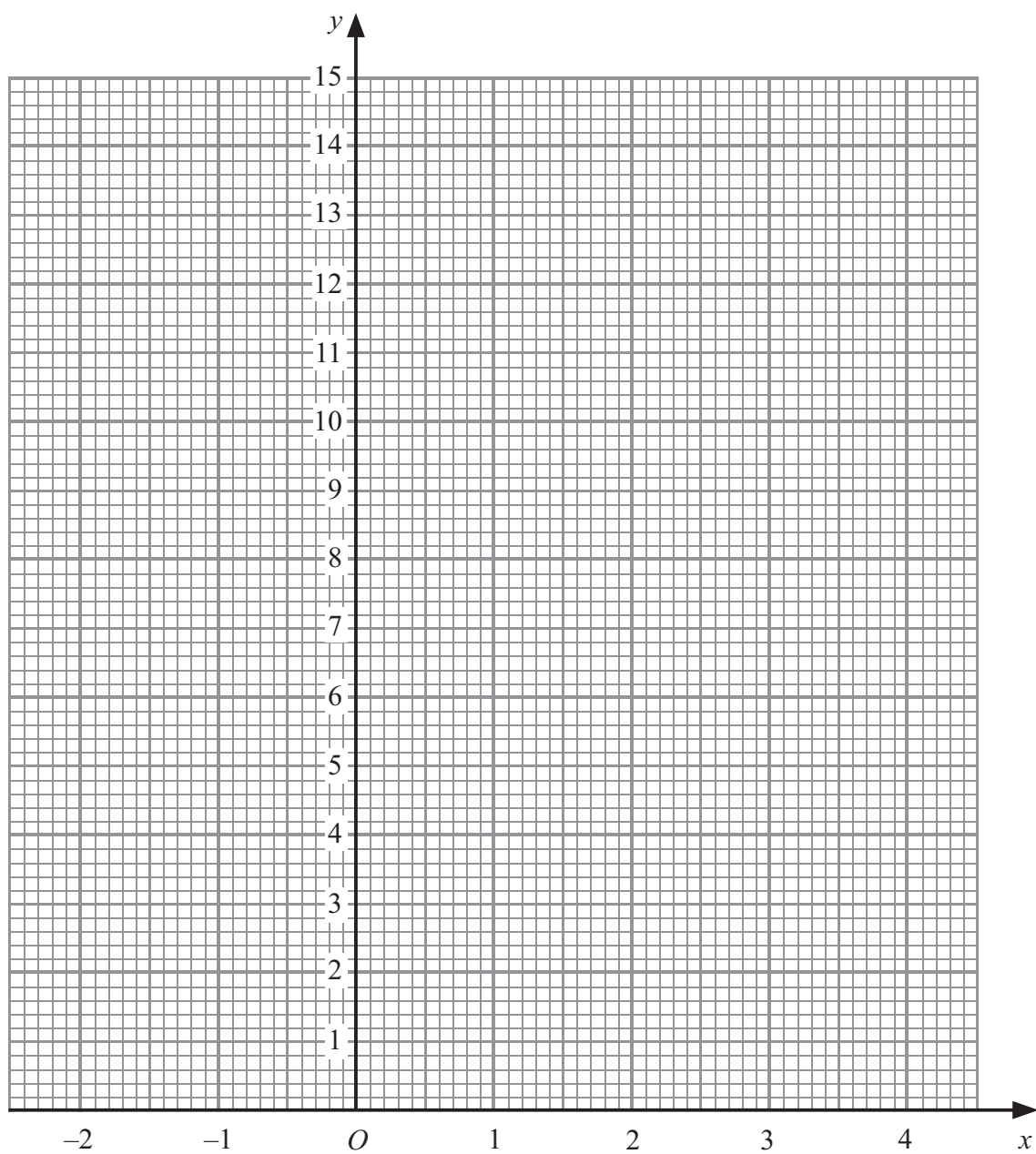
....

(ii) find an estimate for the probability that the next pizza sold will be either a Hawaiian or a Seafood pizza.

....

(Total for Question 8 is 4 marks)

9 (a) On the grid, draw the graph of $y - 2x = 5$ for values of x from $x = -2$ to $x = 4$

(3)

(b) Use your graph to find

   (i)   the value of y when $x = -0.5$

$y =$ ....

   (ii)   the value of x when $y = 8.2$

$x =$ ....

(2)

(Total for Question 9 is 5 marks)

10 The equation of a straight line is $y = 4x + 7$

   (a) Write down the gradient of the line.

....

(1)

   (b) Write down the y-intercept of the line.

....

(1)

(Total for Question 10 is 2 marks)

11 The size of the obtuse angle in an isosceles triangle is $x°$.

Write an expression, in terms of x, for the size, in degrees, of one of the other two angles.

....

(Total for Question 11 is 2 marks)

12 (a) Factorise fully $\qquad 3x^2 - 6x$

....

(2)

(b) Expand and simplify $\qquad 3(2y + 7) + 4(y - 5)$

....

(2)

(c) Solve $\qquad 12 = 5(x - 2)$

....

(3)

(Total for Question 12 is 7 marks)

13 Here are some shapes.
Some of the shapes are quadrilaterals and some of the shapes have at least one right angle.

Q = {quadrilaterals}.
R = {shapes which have at least one right angle}.

Write the number for each shape in the correct place in the Venn diagram.

1   2   3   4

5   6   7

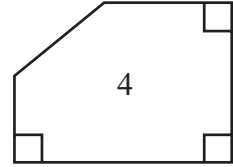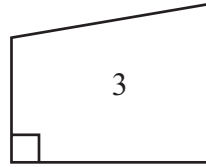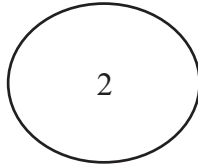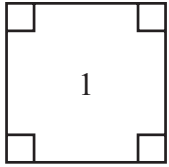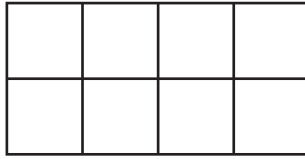Q   R
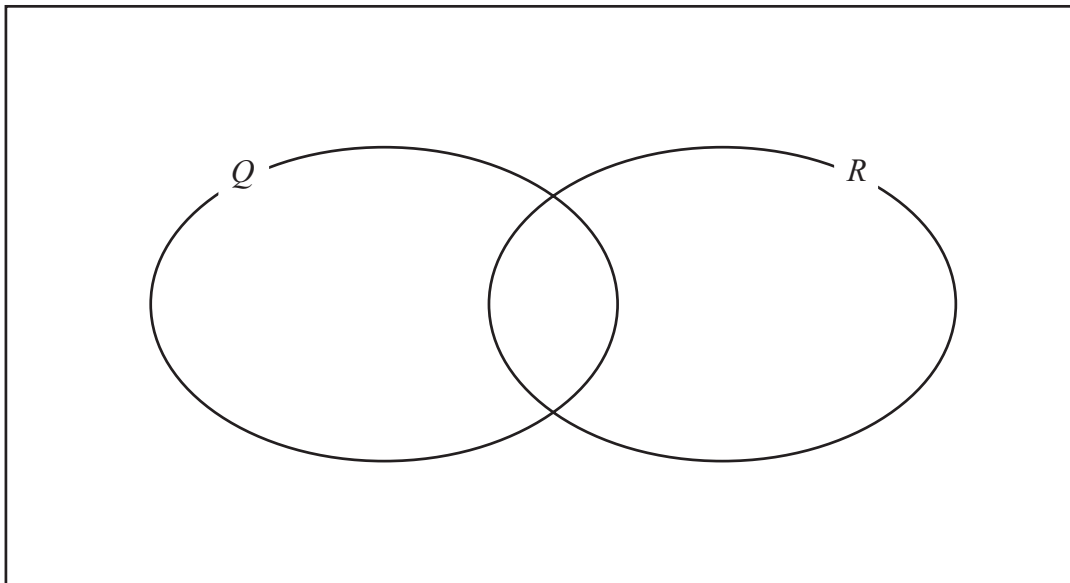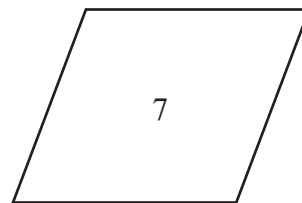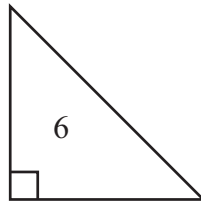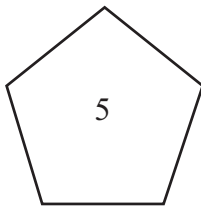
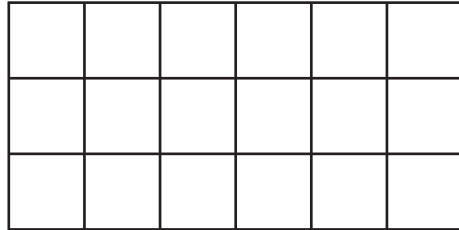**(Total for Question 13 is 4 marks)**

Turn over ▶

14 Here is a sequence of patterns made from centimetre squares.

Pattern Number 1

Pattern Number 2

Pattern Number 3

(a) Write down the number of centimetre squares used in Pattern Number 4

....

(1)

(b) Find an expression, in terms of n, for the number of centimetre squares used in Pattern Number n.

....

(2)

(c) Alex says there is a pattern in this sequence which is made from 200 centimetre squares.

Is Alex correct? ....
Explain your answer.

....

....
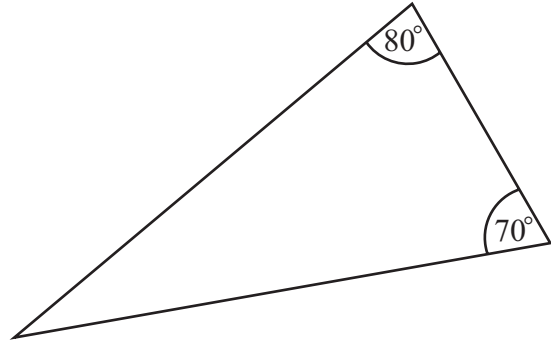
(2)

(Total for Question 14 is 5 marks)

15 (a) Here are two triangles.
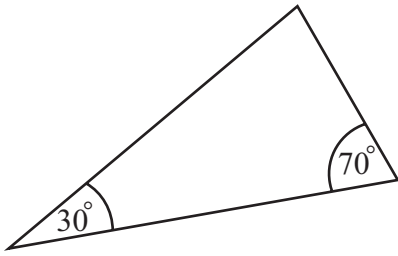
Are these triangles similar?
You must give your reasons.

....

....

(2)
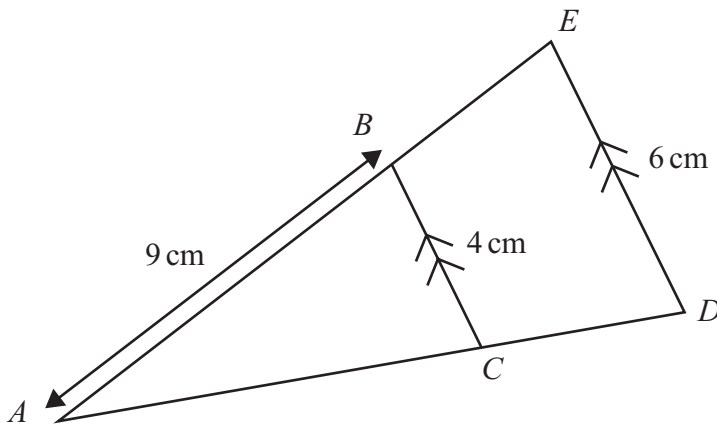
Diagram **NOT**
accurately drawn

(b) Calculate the length *AE*.

....cm

(2)

(Total for Question 15 is 4 marks)

16 Put the following numbers in order.
Start with the smallest number.

$$4.7 \times 10^4 \qquad 4700 \qquad 407 \times 10^{-3} \qquad 0.47 \times 10^2$$

....

(Total for Question 16 is 2 marks)

17 Simplify $\dfrac{x^2 - 9}{x^2 + x - 12}$

....

(Total for Question 17 is 3 marks)

18

T

Diagram **NOT**
accurately drawn
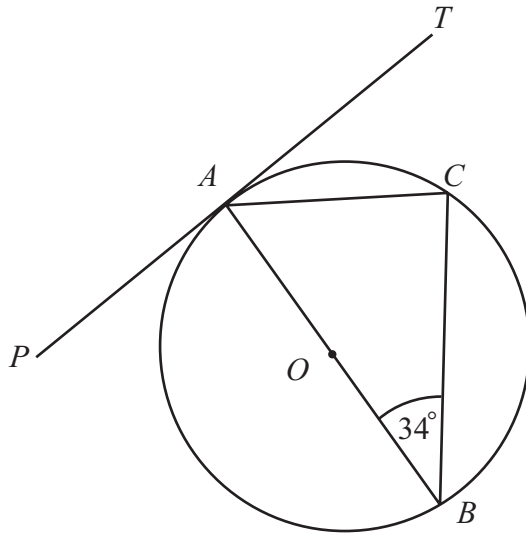
A, B and *C* are points on the circumference of a circle, centre *O*.
PAT is a tangent to the circle.
The angle *ABC* is 34°.

(a) Find the size of the angle *TAC*.
    Give a reason for each stage in your working.

....

(2)
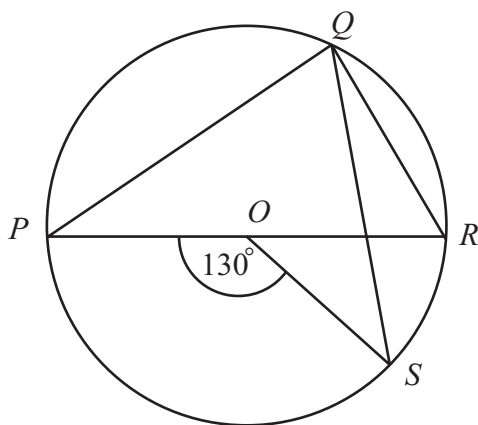
Diagram **NOT** accurately drawn

P, Q, R and *S* are points on the circumference of a circle, centre *O*.
POR is a diameter of the circle.
The angle *POS* is 130°.

*(b) Find the size of angle *SQR*.
    Give reasons for your answer.

(4)

(Total for Question 18 is 6 marks)

19 (a) Write down the value of 8^0

....
(1)

(b) Write down the value of 14^{-1}

....
(1)

(c) Work out the value of $27^{\frac{2}{3}}$

....
(2)

(Total for Question 19 is 4 marks)

20 Prove algebraically that the sum of any two odd numbers is even.

(Total for Question 20 is 3 marks)

21 S is the event 'picking a red counter' and P(S) $= \dfrac{2}{9}$

(a) Write down the value of P(S')

....

(1)

Miles puts 3 green blocks, 5 white blocks and 1 pink block in a bag.
He takes at random a block from the bag.
He writes down the colour of the block.
He puts the block back in the bag.

He then takes at random a second block from the bag and writes down its colour.

(b) Work out the probability that

   (i)   he takes one white block and one pink block,

....

   (ii) at least one of the blocks he takes is white.

....

(5)

(Total for Question 21 is 6 marks)

P 4 0 1 1 5 A 0 2 2 2 4

22 (a) Rationalise the denominator of $\dfrac{6}{\sqrt{5}}$

....

(2)

(b) Expand and simplify $\left(2 + \sqrt{10}\right)\left(\sqrt{5} + \sqrt{20}\right)$

....

(4)

(Total for Question 22 is 6 marks)

23 (a) Solve $x^2 - 6x - 16 = 0$

....

(3)

Hence or otherwise

(b) solve $(x + 2)^2 - 6(x + 2) - 16 = 0$

....

(2)

(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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