	KU	RE

1. Evaluate

$$5{\cdot}04 + 8{\cdot}4 \div 7.$$

2

2. Evaluate

$$\tfrac{2}{7}(1\tfrac{3}{4} + \tfrac{3}{8}).$$

2

3. Simplify

$$3(2x - 4) - 4(3x + 1).$$

3

4. $$f(x) = 7 - 4x$$

(*a*) Evaluate $f(-2)$.
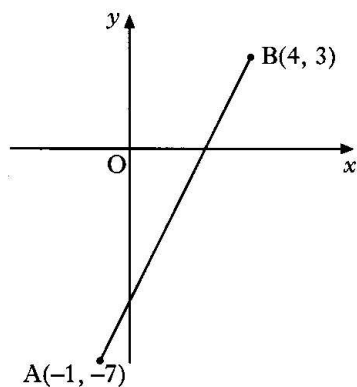
1

(*b*) Given that $f(t) = 9$, find t.

2

5. Factorise

$$2x^2 - 7x - 15.$$

2

[Turn over

6. In the diagram below, A is the point (–1, –7) and B is the point (4, 3).

(a) Find the gradient of the line AB.

(b) AB cuts the y-axis at the point (0, –5).
Write down the equation of the line AB.

(c) The point (3*k*, *k*) lies on AB.
Find the value of *k*.

7. Andrew and Doreen each book in at the Sleepwell Lodge.

(a) Andrew stays for 3 nights and has breakfast on 2 mornings.
His bill is £145.
Write down an algebraic equation to illustrate this.

(b) Doreen stays for 5 nights and has breakfast on 3 mornings.
Her bill is £240.
Write down an algebraic equation to illustrate this.

(c) Find the cost of one breakfast.

**8.** A mini lottery game uses **red, green, blue** and **yellow** balls.

There are 10 of **each** colour, numbered from 1 to 10.

The balls are placed in a drum and one is drawn out.

(*a*) What is the probability that it is a **6**?

(*b*) What is the probability that it is a **yellow 6**?

9. A random check is carried out on the contents of a number of matchboxes.

A summary of the results is shown in the boxplot below.

47   50 51   53 54
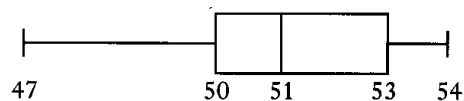
What percentage of matchboxes contains fewer than 50 matches?

10. School theatre visits are arranged for parents, teachers and pupils.

The ratio of parents to teachers to pupils **must** be 1 : 3 : 15.

(*a*) 45 pupils want to go to the theatre.

How many teachers must accompany them?

(*b*) The theatre gives the school 100 tickets for a play.

What is the maximum number of pupils who can go to the play?

KU	RE
1	
1	
	1
1	
	3

11. Using the sequence

$$1, \quad 3, \quad 5, \quad 7, \quad 9, \ldots$$

(*a*) Find S_3, the sum of the first 3 numbers.

(*b*) Find S_n, the sum of the first n numbers.

(*c*) Hence or otherwise, find the $(n + 1)^{\text{th}}$ term of the sequence.

12. (*a*) Evaluate

$$8^{\frac{2}{3}}.$$

(*b*) Simplify

$$\frac{\sqrt{24}}{\sqrt{2}}.$$

13. A rectangular clipboard has a triangular plastic pocket attached as shown in Figure 1.

Figure 1

The pocket is attached along edges TD and DB as shown in Figure 2.

B is x centimetres from the corner C.

Figure 2

The length of the clipboard is $4x$ centimetres and the breadth is $3x$ centimetres.

The area of the pocket is a quarter of the area of the clipboard.

Find, in terms of x, the length of TD.

4

1. Bacteria in a test-tube increase at the rate of 0·6% per hour.

   At 12 noon, there are 5000 bacteria.

   At 3pm, how many bacteria will be present?

   Give your answer **to 3 significant figures**.

2. Fiona checks out the price of a litre of milk in several shops.

   The prices in pence are:

   $$49 \quad 44 \quad 41 \quad 52 \quad 47 \quad 43.$$

   (*a*) Find the mean price of a litre of milk.

   (*b*) Find the standard deviation of the prices.

   (*c*) Fiona also checks out the price of a kilogram of sugar in the same shops and finds that the standard deviation of the prices is 2·6.

   Make one valid comparison between the two sets of prices.

3. Two yachts leave from harbour H.

   Yacht A sails on a bearing of 072° for 30 kilometres and stops.

   Yacht B sails on a bearing of 140° for 50 kilometres and stops.

   How far apart are the two yachts when they have both stopped?

   Do not use a scale drawing.

4. A mug is in the shape of a cylinder with diameter 10 centimetres and height 14 centimetres.
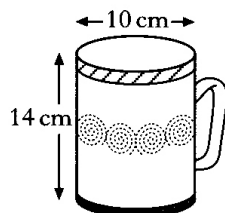
(a) Calculate the volume of the mug.

(b) 600 millilitres of coffee are poured in.
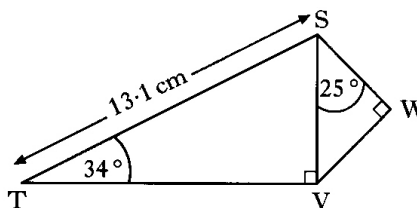
Calculate the depth of the coffee in the cup.

5. The number of diagonals, d, in a polygon with n sides is given by the formula

$$d = \frac{n(n-3)}{2}.$$

A polygon has 20 diagonals.

How many sides does it have?

6. In the diagram,

Angle STV = 34°

Angle VSW = 25°

Angle SVT = Angle SWV = 90°

ST = 13·1 centimetres.

Calculate the length of SW.

7. The area of triangle ABC is 38 square centimetres.

AB is 9 centimetres and BC is 14 centimetres.

Calculate the size of the acute angle ABC.

8. The diagram below shows part of the graph of a quadratic function, with equation of the form $y = k(x - a)(x - b)$.

The graph cuts the y-axis at $(0, -6)$ and the x-axis at $(-1, 0)$ and $(3, 0)$.

(*a*) Write down the values of a and b.

(*b*) Calculate the value of k.

(*c*) Find the coordinates of the minimum turning point of the function.

9. Two perfume bottles are mathematically similar in shape.
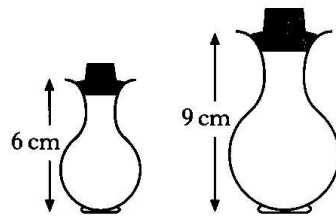
The smaller one is 6 centimetres high and holds 30 millilitres of perfume.

The larger one is 9 centimetres high.

What volume of perfume will the larger one hold?

10. A sheep shelter is part of a cylinder as shown in Figure 1.
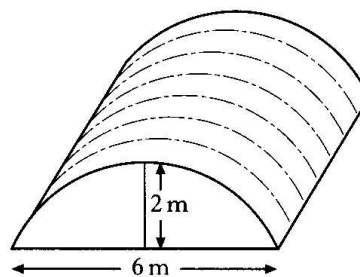
It is 6 metres wide and 2 metres high.

Figure 1

The cross-section of the shelter is a segment of a circle with centre O, as shown in Figure 2.
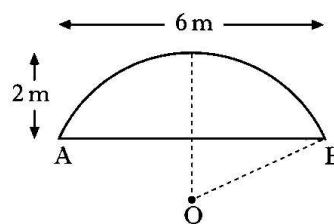
OB is the radius of the circle.

Figure 2

Calculate the length of OB.

11. (*a*) A driver travels from A to B, a distance of x miles, at a constant speed of 75 kilometres per hour.

Find the time taken for this journey in terms of x.

(*b*) The time for the journey from B to A is $\frac{x}{50}$ hours.

Hence calculate the driver's average speed for the whole journey.

KU	RE
1	
	4