22 Solve $3x^2 - 4x - 2 = 0$
Give your solutions correct to 3 significant figures.

.....

(Total for Question 22 is 3 marks)

19 Rob is learning about the planets.

Rob makes a model of the Sun.
He also makes a model of the planet Jupiter.

Rob is going to hang the two models in the school hall.

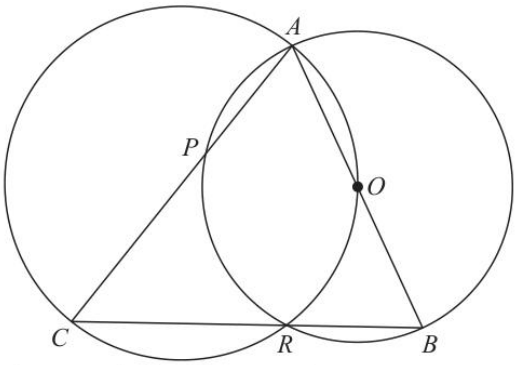
Rob wants a distance of 16 m between the two models.
The real distance between the planet Jupiter and the Sun is 8×10^8 km.

Work out the scale Rob should use.
Give your answer in the form 1 : n

.....

(Total for Question 19 is 3 marks)

21



A, *B*, *R* and *P* are four points on a circle with centre *O*.
A, *O*, *R* and *C* are four points on a different circle.
The two circles intersect at the points *A* and *R*.

CPA, *CRB* and *AOB* are straight lines.

Prove that angle *CAB* = angle *ABC*.

(Total for Question 21 is 4 marks)

3 The number of hours, H, that some machines take to make 5000 bottles is given by

$$H = \frac{72}{n}$$ where n is the number of machines.

On Monday, 6 machines made 5000 bottles.
On Tuesday, 9 machines made 5000 bottles.

The machines took more time to make the bottles on Monday than on Tuesday.

How much more time?

..... hours

(Total for Question 3 is 2 marks)

17 (a) Show that the equation $x^4 - x^2 - 5 = 0$ can be written in the form $x = \sqrt[4]{x^2 + 5}$

(1)

(b) Starting with $x_0 = 1.5$

use the iteration formula $x_{n+1} = \sqrt[4]{x_n^2 + 5}$ three times to find an estimate for a solution of $x^4 - x^2 - 5 = 0$

(Total for Question 17 is 4 marks)

14 Show that $\frac{x^2 - x - 6}{2x^2 - 5x - 3}$ can be written in the form $\frac{ax + b}{cx + d}$ where a, b, c and d are integers.

(Total for Question 14 is 3 marks)

12 Here are the first five terms of an arithmetic sequence.

4 9 14 19 24

(a) Find, in terms of n, an expression for the nth term of this sequence.

.....

(2)

Here are the first five terms of a different sequence.

2 2 0 –4 –10

An expression for the nth term of this sequence is $3n - n^2$

(b) Write down, in terms of n, an expression for the nth term of a sequence whose first five terms are

4 4 0 –8 –20

.....

(1)

(Total for Question 12 is 3 marks)

15 A cinema sells adult tickets and child tickets.

The total cost of 3 adult tickets and 1 child ticket is £30
The total cost of 1 adult ticket and 3 child tickets is £22

Work out the cost of an adult ticket and the cost of a child ticket.

adult ticket £.....

child ticket £.....

(Total for Question 15 is 4 marks)

3 $f = 3g + 7h$

(a) Work out the value of f when $g = -5$ and $h = 2$

$f =$ .....

(2)

(b) Factorise $3x + 6$

.....

(1)

(c) Expand and simplify $5(y - 2) + 2(y - 3)$

.....

(2)

(d) Simplify $m^5 \times m^3$

.....

(1)

(e) Simplify $\frac{p^6}{p^2}$

.....

(1)

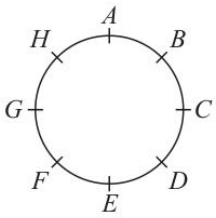
(Total for Question 3 is 7 marks)

16 Solve $(x-2)^2 = 3$

Give your solutions correct to 3 significant figures.

(Total for Question 16 is 2 marks)

3 Hasmeet walks once round a circle with diameter 80 metres.



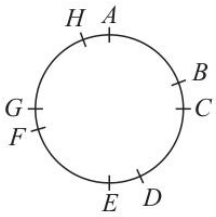
There are 8 points equally spaced on the circumference of the circle.

(a) Find the distance Hasmeet walks between one point and the next point.

.....m

(2)

Four of the points are moved, as shown in the diagram below.



Hasmeet walks once round the circle again.

(b) Has the mean distance that Hasmeet walks between one point and the next point changed? You must give a reason for your answer.

.....

.....

(1)

(Total for Question 3 is 3 marks)

DO NOT WRITE IN THIS AREA

2 (a) Find the Highest Common Factor (HCF) of 60 and 84

(2)

.....

(2)

(b) Find the Lowest Common Multiple (LCM) of 24 and 40

(Total for Question 2 is 4 marks)

18 The straight line $\mathbf{L}_1$ passes through the points with coordinates (4, 6) and (12, 2)
The straight line $\mathbf{L}_2$ passes through the origin and has gradient -3

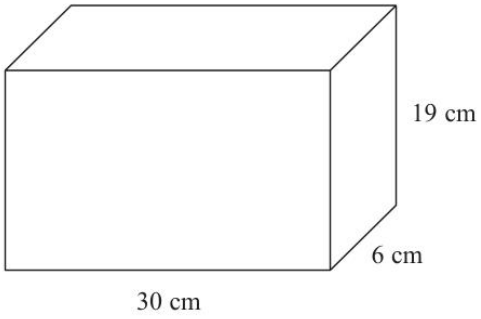
The lines $\mathbf{L}_1$ and $\mathbf{L}_2$ intersect at point P.

Find the coordinates of P.

(..... , ...)

(Total for Question 18 is 4 marks)

4 A container is in the shape of a cuboid.



The container is $\frac{2}{3}$ full of water.

A cup holds 275 m*l* of water.

What is the greatest number of cups that can be completely filled with water from the container?

(Total for Question 4 is 4 marks)

3 Hannah is planning a day trip for 195 students.

She asks a sample of 30 students where they want to go.
Each student chooses one place.

The table shows information about her results.

Place	Number of students
Theme Park	10
Theatre	5
Sports Centre	8
Seaside	7

(i) Work out how many of the 195 students you think will want to go to the Theme Park.

(ii) State any assumption you made **and** explain how this may affect your answer.

.....

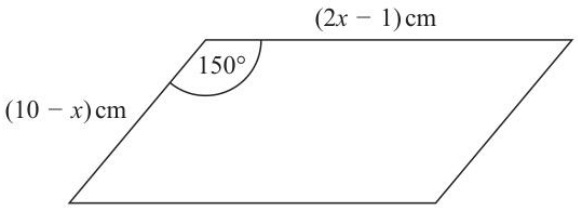
.....

.....

(1)

(Total for Question 3 is 3 marks)

23 The diagram shows a parallelogram.



The area of the parallelogram is greater than 15 cm^2

(a) Show that $2x^2 - 21x + 40 < 0$

(b) Find the range of possible values of x.

(Total for Question 23 is 6 marks)

16 Marek has 9 cards.
There is a number on each card.

1	2	3	4	5	6	7	8	9

Marek takes at random two of the cards.
He works out the product of the numbers on the two cards.

Work out the probability that the product is an even number.

(Total for Question 16 is 3 marks)

DO NOT WRITE IN THIS AREA

2 The length of a pencil is 128 mm correct to the nearest millimetre.

Complete the error interval for the length of the pencil.

..... mm $\leqslant$ length $<$ ..... mm

(Total for Question 2 is 2 marks)

15 The ratio of Marta's hourly pay to Khalid's hourly pay is 6 : 5

Both Marta and Khalid get an increase of £1.50 in their hourly pay.
The ratio of Marta's hourly pay to Khalid's hourly pay after this increase is 13 : 11

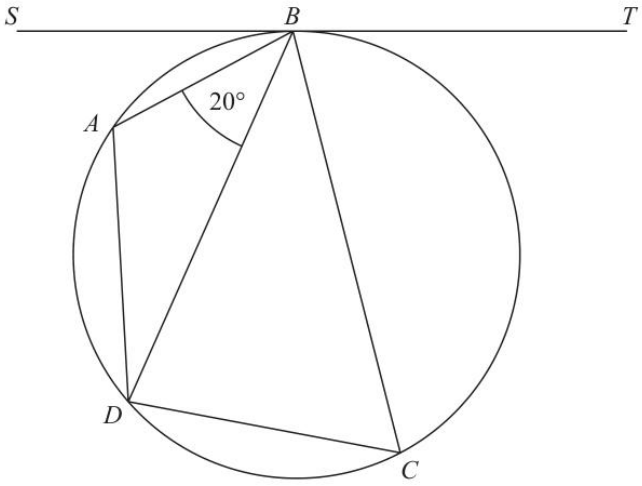
Work out the hourly pay before the increase for Marta and for Khalid.

Marta £.....

Khalid £.....

(Total for Question 15 is 4 marks)

14



A, B, C and D are four points on a circle.
SBT is a tangent to the circle.
Angle $ABD = 20°$

the size of angle BAD : the size of angle $BCD = 3 : 1$

Find the size of angle SBA.
Give a reason for each stage of your working.

(Total for Question 14 is 4 marks)

10 Louise invests £x in Better Investments for 3 years.
Sadiq invests £x in County Bank for 3 years.

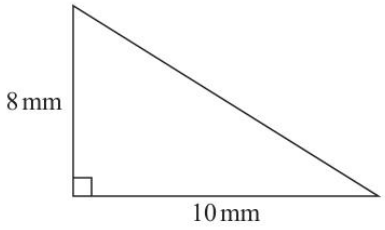
Better Investments
Compound Interest
2.5% per annum

County Bank
Compound Interest
2% per annum for the first two years 3.5% per annum for each extra year

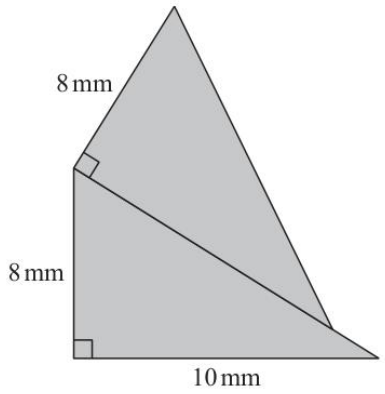
At the end of the 3 years, the value of Louise's investment is £344 605
Work out the value of Sadiq's investment at the end of the 3 years.

(Total for Question 10 is 4 marks)

5 Here is a right-angled triangle.



The shaded shape below is made from two of these triangles.



Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

(Total for Question 5 is 4 marks)