GCSE Grade 7

Maths Booklet 2

Paper 1H
Non-Calculator

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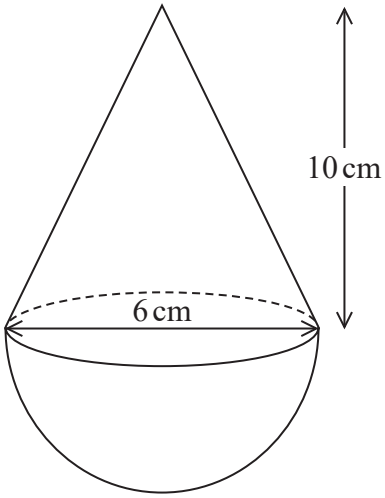
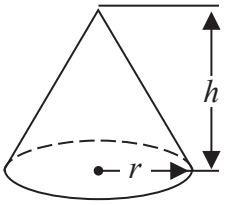
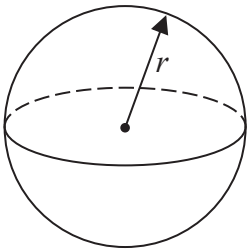
1 The diagram shows a solid shape.
The shape is a cone on top of a hemisphere.



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



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



The height of the cone is 10 cm.
The base of the cone has a diameter of 6 cm.
The hemisphere has a diameter of 6 cm.

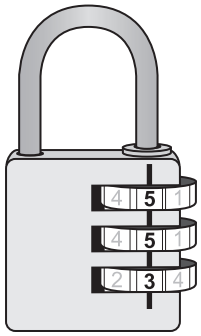
The total volume of the shape is $k\pi$ cm^3, where k is an integer.

Work out the value of k.

$k =$ .....

(Total for Question 1 is 4 marks)

2 There are three dials on a combination lock.
Each dial can be set to one of the numbers 1, 2, 3, 4, 5
The three digit number 553 is one way the dials can be set, as shown in the diagram.



(a) Work out the number of different three digit numbers that can be set for the combination lock.

.....

(2)

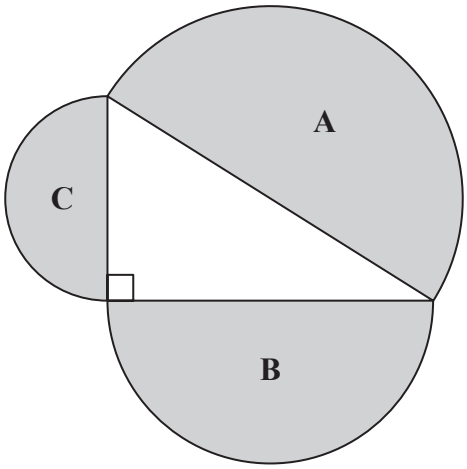
(b) How many of the possible three digit numbers have three different digits?

.....

(2)

(Total for Question 2 is 4 marks)

3 A right-angled triangle is formed by the diameters of three semicircular regions, **A**, **B** and **C** as shown in the diagram.

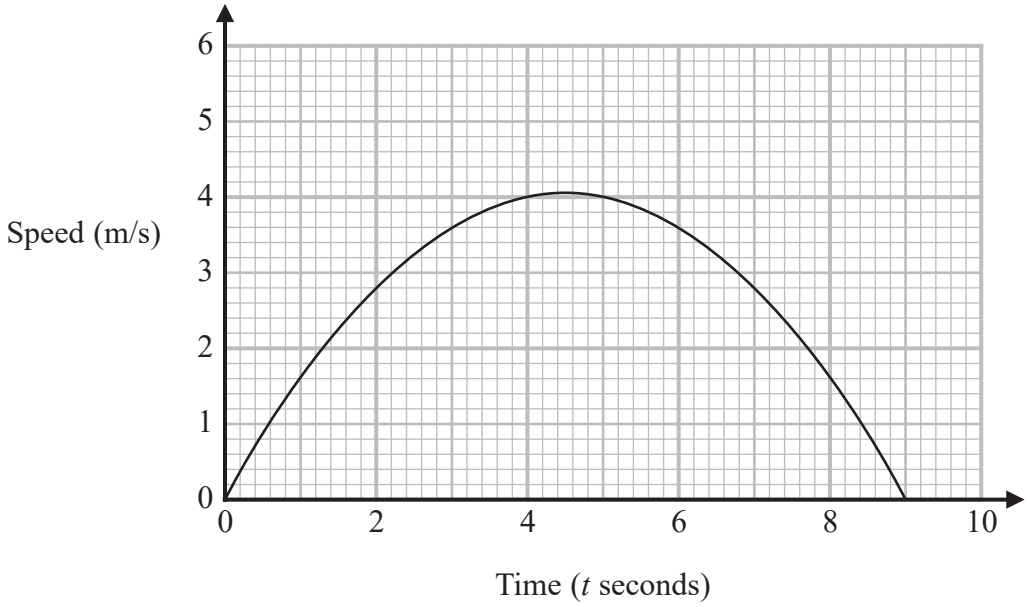


Show that

area of region **A** = area of region **B** + area of region **C**

(Total for Question 3 is 3 marks)

4 Here is a speed-time graph.



(a) Work out an estimate of the gradient of the graph at $t = 2$

.....

(3)

(b) What does the area under the graph represent?

.....

.....

(1)

(Total for Question 4 is 4 marks)

5 A, B and C are three points such that

$\overrightarrow{AB} = 3\mathbf{a} + 4\mathbf{b}$

$\overrightarrow{AC} = 15\mathbf{a} + 20\mathbf{b}$

(a) Prove that A, B and C lie on a straight line.

(2)

D, E and F are three points on a straight line such that

$\overrightarrow{DE} = 3\mathbf{e} + 6\mathbf{f}$

$\overrightarrow{EF} = -10.5\mathbf{e} - 21\mathbf{f}$

(b) Find the ratio

length of DF : length of DE

.....

(3)

(Total for Question 5 is 5 marks)

6 A first aid test has two parts, a theory test and a practical test.
The probability of passing the theory test is 0.75
The probability of passing only one of the two parts is 0.36

The two events are independent.

Work out the probability of passing the practical test.

.....

(Total for Question 6 is 4 marks)

7 Jack and Sadia work for a company that sells boxes of breakfast cereal.

The company wants to have a special offer.

Here is Jack's idea for the special offer.

> Put 25% more cereal into each box and do **not** change the price.

Here is Sadia's idea.

> Reduce the price and do **not** change the amount of cereal in each box.

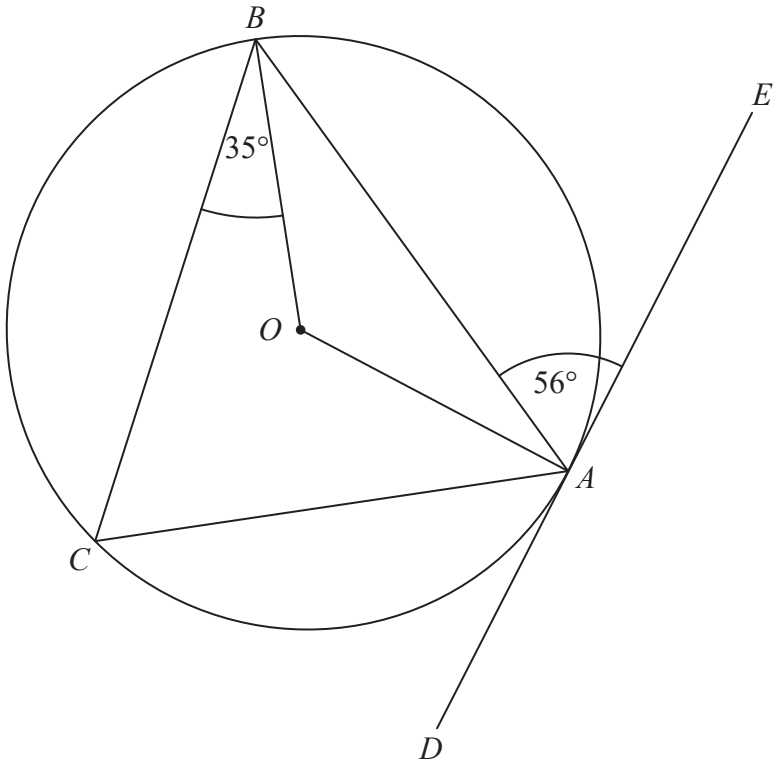
Sadia wants her idea to give the same value for money as Jack's idea.

By what percentage does she need to reduce the price?

..... %

(Total for Question 7 is 3 marks)

8



A, *B* and *C* are points on the circumference of a circle, centre *O*.
DAE is the tangent to the circle at *A*.

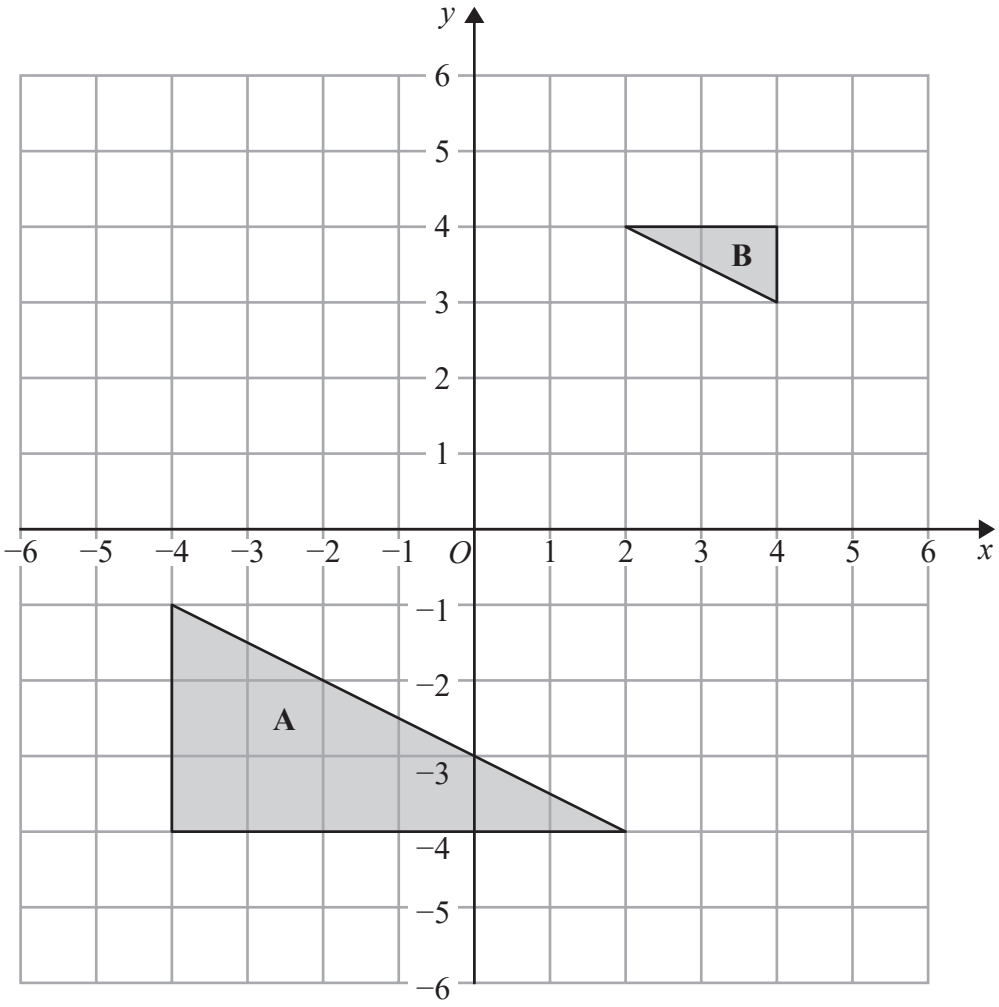
Angle *BAE* = 56°
Angle *CBO* = 35°

Work out the size of angle *CAO*.
You must show all your working.

.....°

(Total for Question 8 is 3 marks)

9



Describe fully the single transformation that maps triangle **A** onto triangle **B**.

.....

(Total for Question 9 is 2 marks)

10 (a) Work out the value of $\left(\frac{16}{81}\right)^{\frac{3}{4}}$

.....

(2)

$3^a = \frac{1}{9}$ $3^b = 9\sqrt{3}$ $3^c = \frac{1}{\sqrt{3}}$

(b) Work out the value of $a + b + c$

.....

(2)

(Total for Question 10 is 4 marks)