

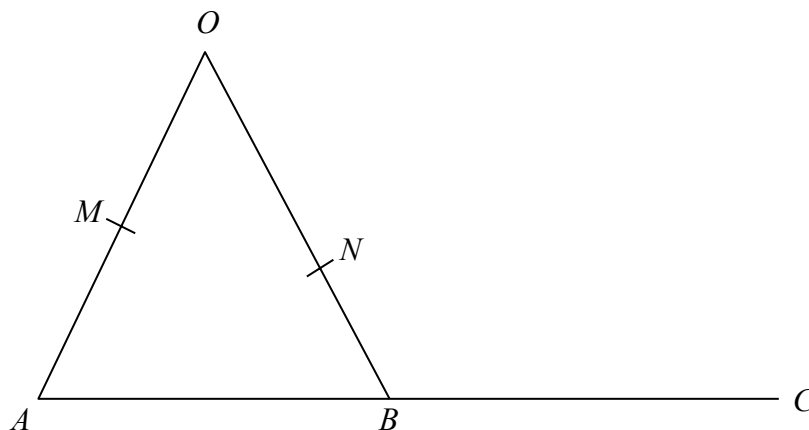
**GCSE Grade 8/9**

**Maths**  
**Booklet 6**

Paper 3H  
Calculator

[www.ggmaths.co.uk](http://www.ggmaths.co.uk)

1



$OMA$ ,  $ONB$  and  $ABC$  are straight lines.

$M$  is the midpoint of  $OA$ .

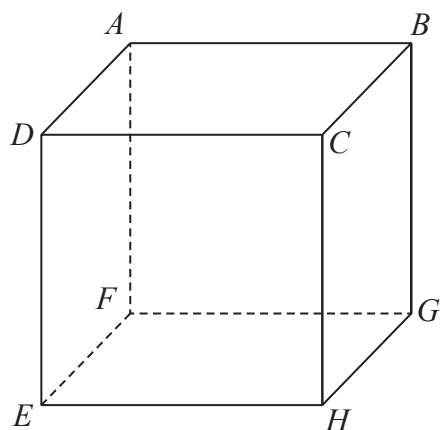
$B$  is the midpoint of  $AC$ .

$\vec{OA} = 6\mathbf{a}$      $\vec{OB} = 6\mathbf{b}$      $\vec{ON} = k\mathbf{b}$  where  $k$  is a scalar quantity.

Given that  $MNC$  is a straight line, find the value of  $k$ .

(Total for Question 1 is 5 marks)

- 2 The diagram shows a cube.



$AH = 11.3$  cm correct to the nearest mm.

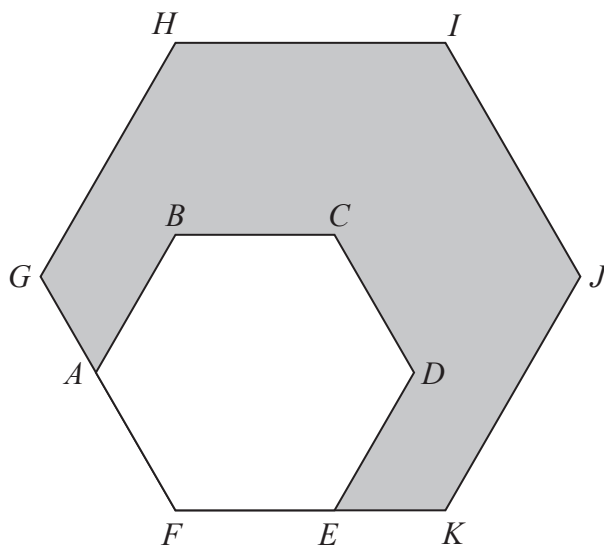
Calculate the lower bound for the length of an edge of the cube.  
You must show all your working.

..... cm

(Total for Question 2 is 4 marks)



3



$ABCDEF$  is a regular hexagon with sides of length  $x$ .

This hexagon is enlarged, centre  $F$ , by scale factor  $p$  to give hexagon  $FGHIJK$ .

Show that the area of the shaded region in the diagram is given by  $\frac{3\sqrt{3}}{2}(p^2 - 1)x^2$

(Total for Question 3 is 4 marks)



4  $5c + d = c + 4d$

(a) Find the ratio  $c : d$

.....  
(2)

$6x^2 = 7xy + 20y^2$  where  $x > 0$  and  $y > 0$

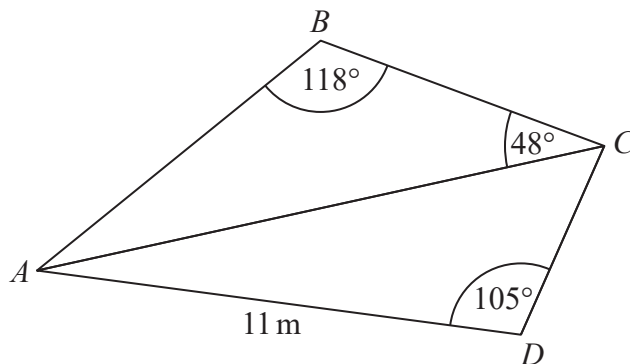
(b) Find the ratio  $x : y$

.....  
(3)

(Total for Question 4 is 5 marks)



5  $ABC$  and  $ADC$  are triangles.



The area of triangle  $ADC$  is  $56 \text{ m}^2$

Work out the length of  $AB$ .

Give your answer correct to 1 decimal place.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

..... m

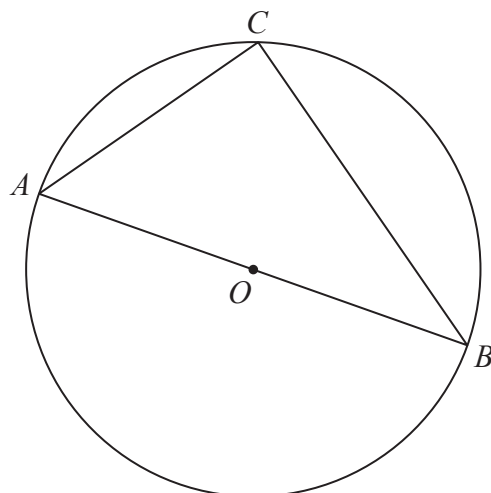
(Total for Question 5 is 5 marks)



- 6 Prove algebraically that the straight line with equation  $x - 2y = 10$  is a tangent to the circle with equation  $x^2 + y^2 = 20$

(Total for Question 6 is 5 marks)





$A$ ,  $B$  and  $C$  are points on the circumference of a circle, centre  $O$ .  
 $AOB$  is a diameter of the circle.

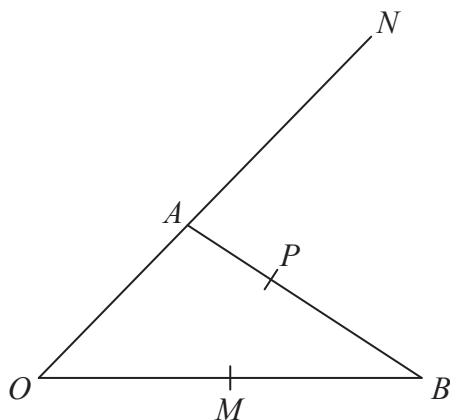
Prove that angle  $ACB$  is  $90^\circ$

You must **not** use any circle theorems in your proof.

(Total for Question 7 is 4 marks)







$OAN$ ,  $OMB$  and  $APB$  are straight lines.

$AN = 2OA$ .

$M$  is the midpoint of  $OB$ .

$$\vec{OA} = \mathbf{a} \quad \vec{OB} = \mathbf{b}$$

$\vec{AP} = k\vec{AB}$  where  $k$  is a scalar quantity.

Given that  $MPN$  is a straight line, find the value of  $k$ .

(Total for Question 8 is 5 marks)

