Mock Grade 8/9

Maths Booklet 6

Paper 2H
Calculator

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1 The number of people living in a town t years from now is P_t where

$$P_0 = 55000$$
$$P_{t+1} = 1.03(P_t - 800)$$

Work out the number of people in the town 3 years from now.

…….....

(Total for question 2 is 3 marks)

2 $X = \dfrac{2a - b}{f}$

$a = 7.5$ correct to 1 decimal place.
$b = 3.42$ correct to 2 decimal places.
$f = 2$ correct to the nearest whole number.

Work out the upper bound of the value of X
Show your working clearly.

.....

(Total for Question 2 is 3 marks)

3 The centre O of a circle has coordinates (4, 7)

The point A, on the circle, has coordinates (6, 11) and AOP is a diameter of the circle.

Find an equation of the tangent to the circle at the point P

.....

(Total for Question 3 is 4 marks)

4

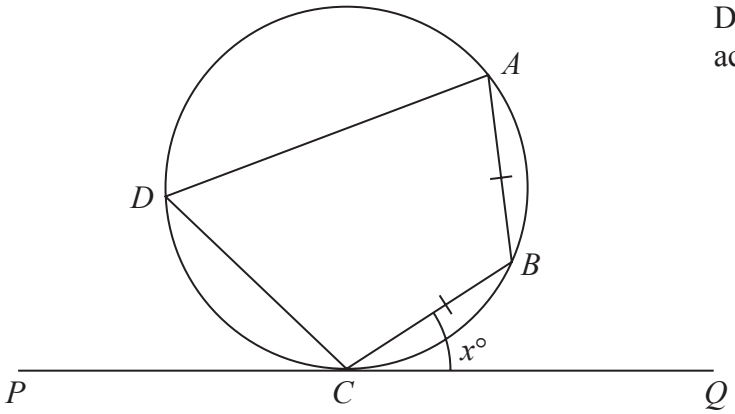


Diagram **NOT** accurately drawn

A, B, C and D are points on a circle.
PCQ is a tangent to the circle.
$AB = CB$.

Angle $BCQ = x°$

Prove that angle $CDA = 2x°$
Give reasons for each stage in your working.

(Total for Question 4 is 5 marks)

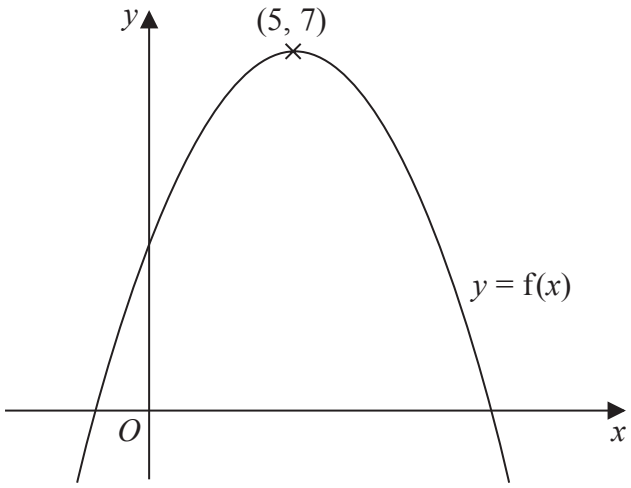
5 $A = w - \frac{x^2}{y}$

$w = 3.45$ correct to 2 decimal places.
$x = 1.9$ correct to 1 decimal place.
$y = 5$ correct to the nearest whole number.

By considering bounds, work out the value of m to a suitable degree of accuracy.
Give a reason for your answer.

(Total for Question 5 is 5 marks)

6 The diagram shows a sketch of the curve with equation $y = f(x)$



There is only one maximum point on the curve.
The coordinates of this maximum point are (5, 7)

Write down the coordinates of the maximum point on the curve with equation

(i) $y = f(x + 9)$

(..... , ...)

(ii) $y = f(x) + 3$

(..... , ...)

(Total for Question 6 is 2 marks)

7 Solve algebraically the simultaneous equations

$$2x^2 + 3y^2 = 14$$

$$x = 2y - 3$$

(Total for Question 7 is 5 marks)

8 The diagram shows quadrilateral *ABCD*

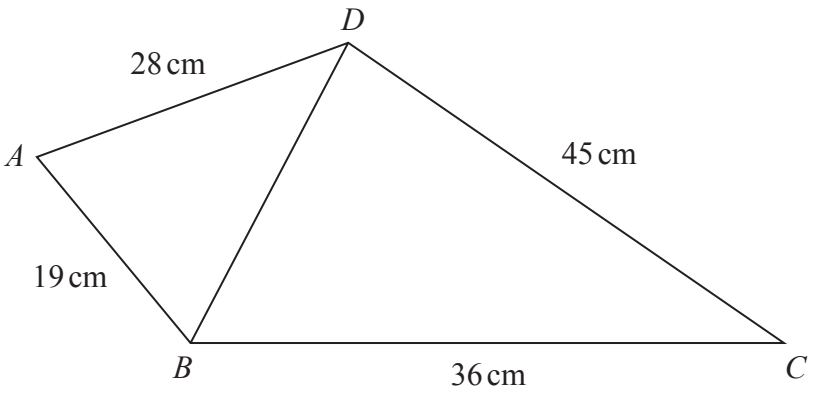


Diagram **NOT** accurately drawn

The angle *BCD* is acute.

Given that the area of triangle *BCD* = 405 cm^2

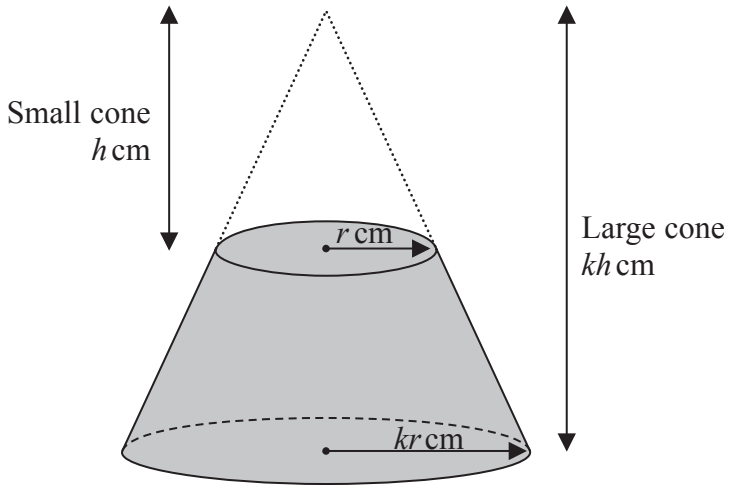
work out the size of angle *ABD*
Give your answer correct to one decimal place.

.....°

(Total for Question 8 is 5 marks)

9 The diagram shows a frustum of a cone, and a sphere.

The frustum, shown shaded in the diagram, is made by removing the small cone from the large cone.
The small cone and the large cone are similar.



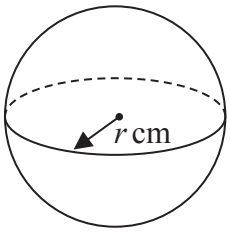


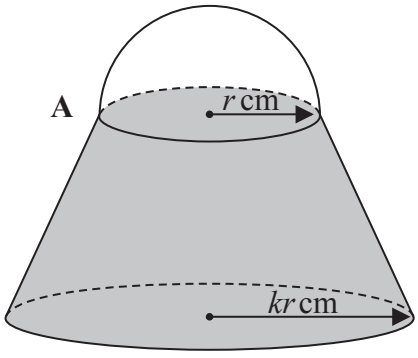
Diagram **NOT** accurately drawn

The height of the small cone is h cm and the radius of the base of the small cone is r cm.
The height of the large cone is kh cm and the radius of the base of the large cone is kr cm.
The radius of the sphere is r cm.

The sphere is divided into two hemispheres, each of radius r cm.

Solid **A** is formed by joining one of the hemispheres to the frustum.
The plane face of the hemisphere coincides with the upper plane face of the frustum, as shown in the diagram below.

Solid **B** is formed by joining the other hemisphere to the small cone that was removed from the large cone.
The plane face of the hemisphere coincides with the plane face of the base of the small cone, as shown in the diagram below.



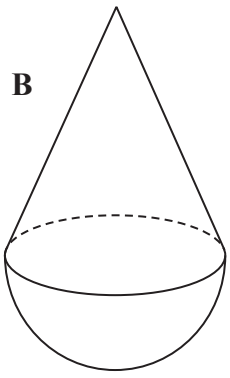


Diagram **NOT** accurately drawn

The volume of solid **A** is 6 times the volume of solid **B**.

Given that $k > \sqrt[3]{7}$

find an expression for h in terms of k and r

$h =$ .....

(Total for Question 9 is 6 marks)