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0178/02

October/November 2020

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical Instruments
Tracing Paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your name, Centre number and candidate number on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

If working is needed for any question it must be shown below that question.

ELECTRONIC CALCULATORS **MUST NOT** BE USED IN THIS PAPER.

The number of marks is given in brackets [] at the end of each question or part question.

The total of the marks for this paper is 70.

This document consists of 11 printed pages and 1 blank page.



- 1 Express $2\frac{10}{11}$ as a recurring decimal.

..... [2]

- 2 (a) Express 520 as a product of its primes.

..... [1]

- (b) It is given that $1260 = 2^2 \times 3^2 \times 5 \times 7$.

Find the smallest integer value of k such that $(1260 \times 520k)$ is a square number.

..... [2]

- 3 $n(A) = 20$, $n(B) = 28$ and $n(A \cup B) = 36$.

Find $n(A \cap B)$.

..... [2]

- 4 $x : y = 3 : 7$ and $y : z = \frac{1}{2} : 3$.

Find the ratio $x : y : z$.

..... [2]

5 Consider the sequence

7, 12, 17, 22, 27,

(a) Write the next **two** terms of the sequence.

..... [1]

(b) Find the n^{th} term of the sequence.

..... [1]

(c) If the k^{th} term is 212, find the value of k .

..... [2]

6 $p = \frac{\sqrt{hq}}{2}$.

(a) Find the value of p when $h = 2$ and $q = 18$.

..... [1]

(b) Make h the subject of the formula.

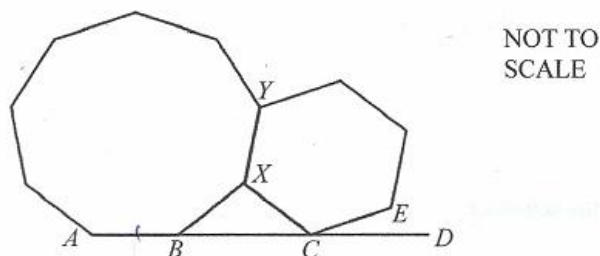
..... [3]

(c) Write a condition for hq so that p is a real number.

..... [1]

- 7 The diagram shows two regular polygons joined at side XY .

AD is a straight line.



Calculate the size of angle ECD .

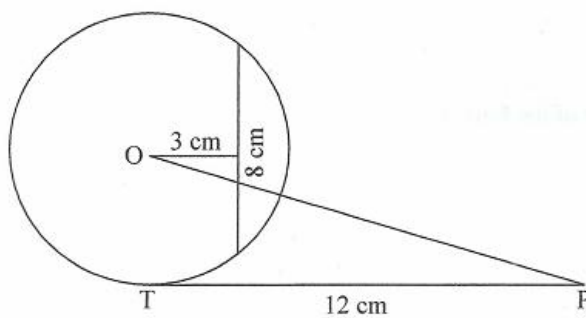
Show your working clearly.

..... [4]

- 8 The diagram shows a circle, centre O , a chord and tangent at the point T .

The chord has length 8 cm and is 3 cm from the centre O .

The tangent, PT , has length 12 cm.

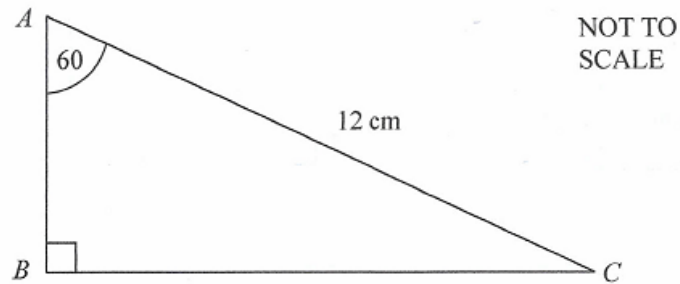


Find the length OP .

..... cm [3]

- 9 The diagram shows a right angled triangle ABC .

$AC = 12$ cm and angle $BAC = 60^\circ$.



$[\sin 60 = 0.866, \cos 60 = 0.5, \tan 60 = 1.732]$

Calculate,

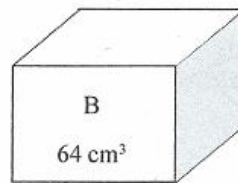
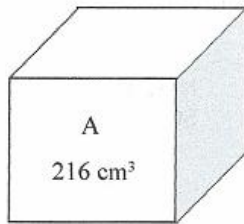
- (a) the area of the triangle,

..... cm [3]

- (b) the shortest distance from B to AC .

..... cm [3]

- 10 The cubes A and B have volume of 216 cm^3 and 64 cm^3 .



NOT TO
SCALE

Find the ratio

- (a) height of A : height of B,

..... [2]

- (b) surface area of A : surface area of B.

..... [1]

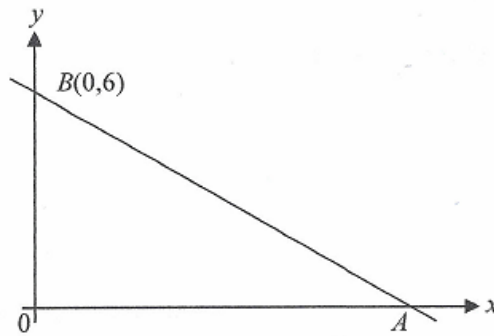
- 11 Two solid spheres of radii 2 cm and 4 cm, respectively, are melted and recast to form a cone of height 8 cm.

$$V_{\text{sphere}} = \frac{4}{3} \pi r^3, \quad V_{\text{cone}} = \frac{1}{3} \pi r^2 h$$

Find the radius of the cone.

..... [3]

- 12 The diagram shows a straight line AB of gradient $\frac{-3}{4}$.



Find

- (a) the coordinates of A,

(,) [2]

- (b) the distance AB,

..... [2]

- (c) the equation of a line parallel to AB passing through (4,2).

..... [2]

- 13 A trader sold an item to a shopkeeper making 20% profit.

The shopkeeper later sold it for M1560 making a 30% profit.

Calculate the price which the trader paid for the item.

..... [3]

-
- 14 Simplify $\frac{12x^2 + ax - 6a^2}{3x - 2a}$

..... [3]

15 Solve.

(a) $\frac{24}{x+1} = 3$

..... [2]

(b) $2p + 3q = 21$

$3p - 2q = -1$

$p =$

$q =$ [3]

(c) $(2t - 5)(t + 3) = 0$

$t =$ or [2]

- 16 p varies inversely as a square of r .

When $p = 9$, $r = 2$.

- (a) Write an expression for p in terms of r

..... [2]

- (b) Find the decrease in p if r is tripled.

..... [3]

- (e) v and w are two other quantities such that p is inversely proportional to v and v is inversely proportional to w .

Show that p is directly proportional to w .

[2]

- 17 Bags A and B contain balls of the same shape and size.

Bag A contains 4 red balls and 2 yellow balls.

Bag B contains 2 red balls and 3 yellow balls.

- (a) A ball is drawn at random from each bag.

Find the probability that both balls are of the same colour.

..... [3]

- (b) Two balls are drawn at random from each bag, one at a time.

Find the probability that:

- (i) the two balls drawn from bag A or bag B are red.

..... [3]

- (ii) all the four balls drawn are red,

..... [1]