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0178/03

October/November 2020

2 hours

Additional Materials: Electronic Calculator
Geometrical Instruments
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write in dark blue or black pen.

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

DO **NOT** WRITE IN ANY BARCODES.

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

Electronic calculators should be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π use either your calculator value or 3.142.

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 100.

1 Evaluate.

$$\sqrt[3]{\frac{7.67^2 + 12}{6.8}}$$

Answer [3]

2 $f(x) = 1 - x$.

Find

(a) $f(3)$,

Answer (a) [1]

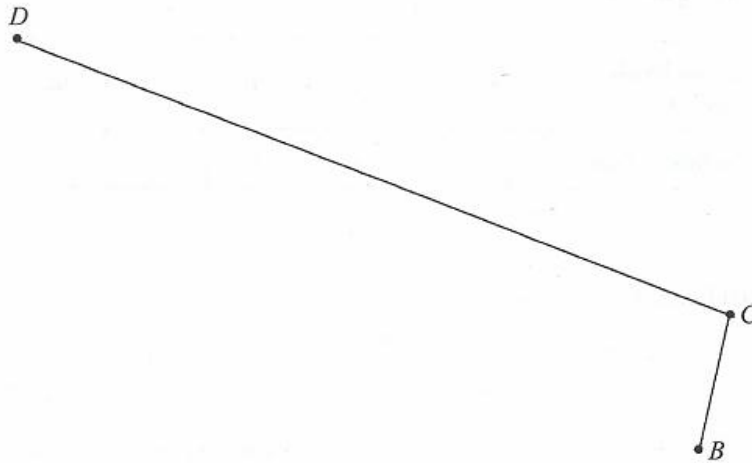
(b) $f(k + 4)$, in terms of k ,

Answer (b) [2]

(c) k when $f\left(2 - \frac{k}{4}\right) = 3$.

Answer (c) [3]

- 3 The diagram shows the points B , C and D and straight lines DC and CB .



- (a) A point A is such that $AB = 10$ cm and $AD = 7.2$ cm.

By construction, complete the quadrilateral $ABCD$.

[3]

- (b) The point O , inside ABC is

- equidistant from points B and C ,
- equidistant from points C and D .

Locate the point O .

[3]

- (c) Draw the circle radius OA , centre O .

[2]

- 4 A survey counts the number of cars travelling at various speed levels.
The table shows the results.

Speed levels (km/h)	50	60	70	80	90
Number of cars	12	5	4	4	7

(a) Find:

- (i) the total frequency,

Answer (a)(i) [1]

- (ii) the range,

Answer (a)(ii) km/h [1]

- (iii) the mode,

Answer (a)(iii) [1]

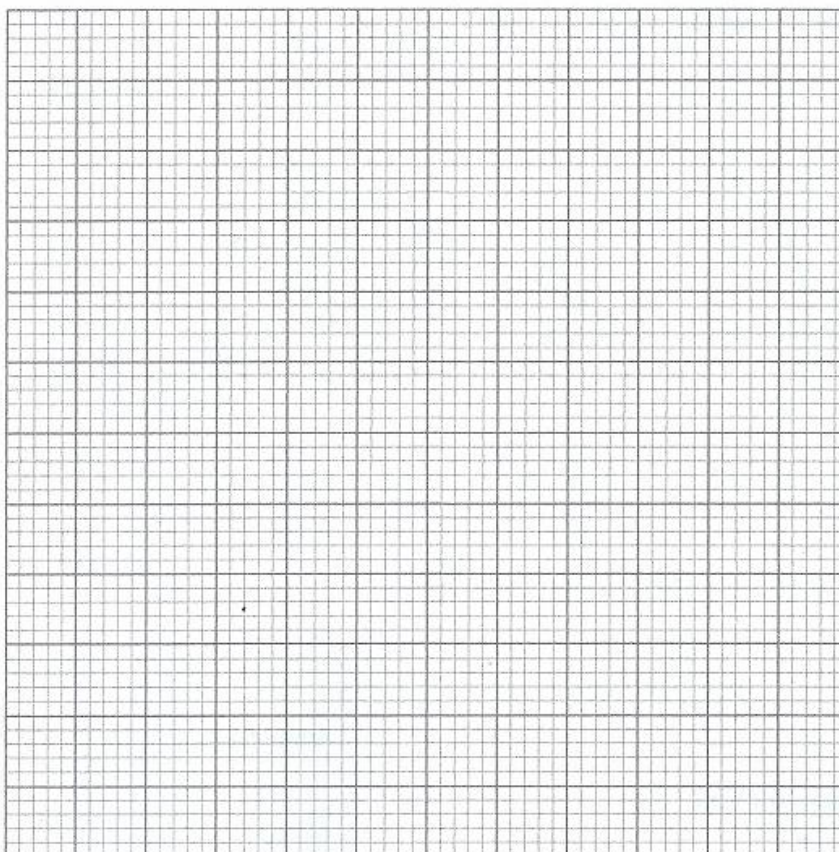
- (iv) the median,

Answer (a)(iv) km/h [2]

- (v) the mean.

Answer (a)(v) km/h [3]

- (b) Draw a bar chart to represent the information on the table.



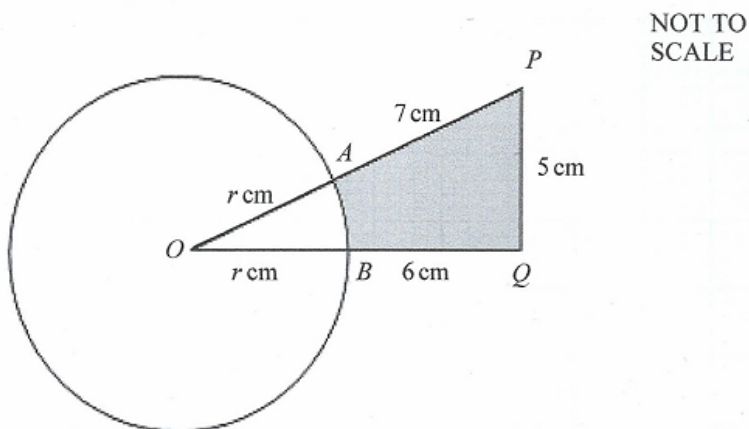
[3]

- (c) A car is chosen at random from those counted.

Find the probability that it was travelling at speed level 90 km/h.

Answer (c) [1]

- 5 The diagram shows a triangle OPQ and a circle, centre O with radius r cm. The circle cuts OP and OQ at A and B respectively. $AP = 7$ cm, $PQ = 5$ cm, $QB = 6$ cm and angle $OQP = 90^\circ$.



- (a) Write an expression, in terms of r , for $\sin \hat{POQ}$.

Answer (a) [1]

- (b) Show that $r = 6$ cm.

Answer (b) [3]

- (c) Calculate

- (i) the length of major arc AB ,

Answer (c)(i) cm [3]

- (ii) the shaded area.

Answer (c)(ii) cm^2 [4]

6 The point $A(1, 5)$ is the midpoint of $B(a, 3)$ and $(a + 1, 7)$.

(a) Show that $a = \frac{1}{2}$

Answer (a) [3]

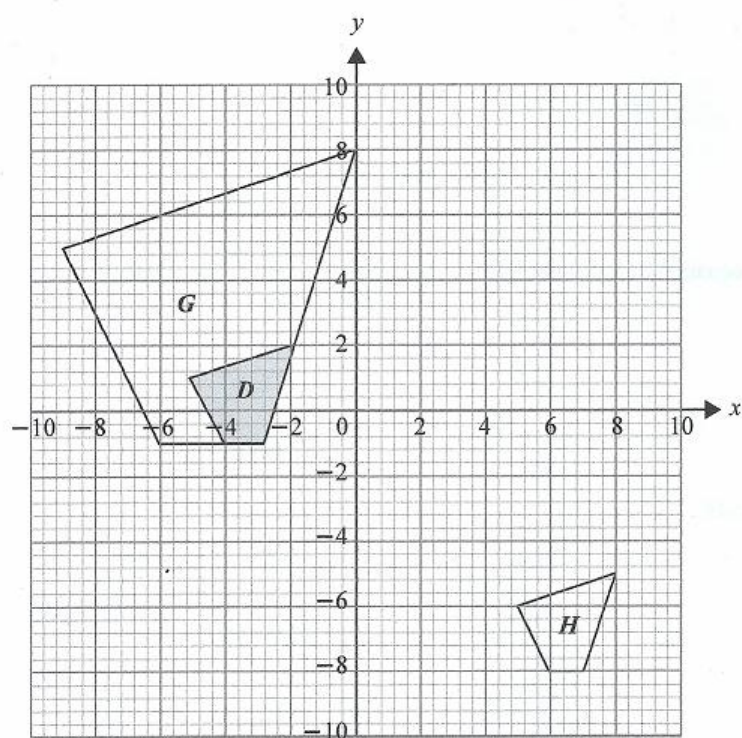
(b) Find the equation of a straight line passing through point A with y -intercept 5.

Answer (b) [2]

(c) Calculate AB .

Answer (c) [2]

- 7 The diagram shows polygons D , G and H .



- (a) Describe fully a **single** transformation that maps

- (i) polygon D onto polygon G ,

Answer (a)(i) [3]

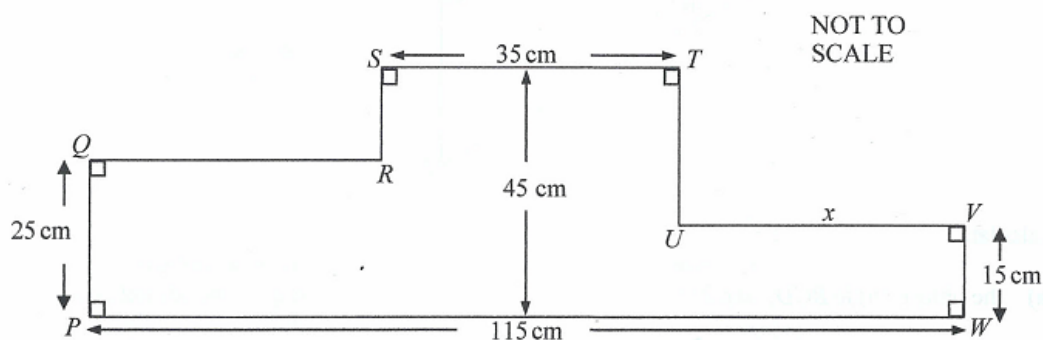
- (ii) polygon D onto polygon H .

Answer (a)(ii) [2]

- (b) On the grid, draw and label the image,
- (i) R , of polygon G , after a reflection in the line $x = 0$, [2]
- (ii) M , of polygon D , after a rotation through 90° anti-clockwise about the point $(-2, -2)$. [2]

8 The diagram shows the *cross section* of a machine.

$$QR = UV.$$



- (a) Show that the value of $x = 40$ cm.

Answer (a) [2]

- (b) (i) Calculate the area of the cross section.

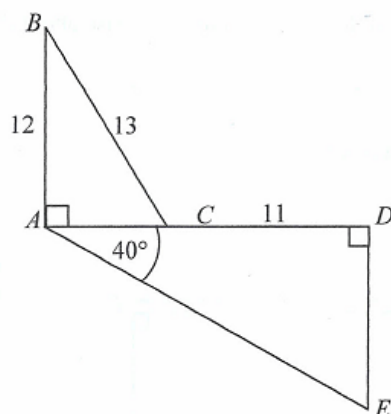
Answer (b)(i) cm^2 [3]

- (ii) The machine is in the form of a prism, k cm long.
The prism is completely filled with some material.
1 **cubic metre** of this material has mass 2 kg.

Find an expression, in terms of k , for the mass of the material used

Answer (b)(ii) kg [3]

- 9 The diagram shows triangles ABC and ADE .
 The straight line ACD is perpendicular to both AB and DE .
 $AB = 12$ cm, $BC = 13$ cm, $CD = 11$ cm and $\angle DAE = 40^\circ$.



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Calculate

- (a) the obtuse angle BCD ,

Answer (a) [3]

- (b) the distance AE .

Answer (b) cm [4]

- 10 (a) The cash price of a mobile set is 10% less than the hire purchase price.
A customer buys the mobile set on a hire purchase and pays a deposit of M300 followed by 12 monthly instalments of M150.

Calculate

- (i) the cash price,

Answer (a)(i) M [3]

- (ii) the rate of interest.

Answer (a)(ii) % [3]

- (b) A bus travelling at an average speed of 45 km/h left the bus stop at 8.15 am.
A taxi left the bus stop at 9.00 am and overtook the bus at 10.45 am.

- (i) How much time, **in hours**, did the taxi take before overtaking the bus.

Answer (b)(i) hours [2]

- (ii) Find the average speed of the taxi.

Answer (b)(ii) km/h [3]

- 11 A farmer had 540 bags of wet sorghum each having a mass of 96 kg.
After the sorghum was left to dry it was observed that the ratio mass of
dried sorghum : mass of wet sorghum = 15 : 16.

(a) Calculate the total mass lost during drying.

Answer (a) kg [3]

- (b) A trader bought the 540 bags of dried sorghum at M168.75 per bag.
He then repacked them into 75 kg bags.
He transported them to a market in loads of up to 162 bags per trip.

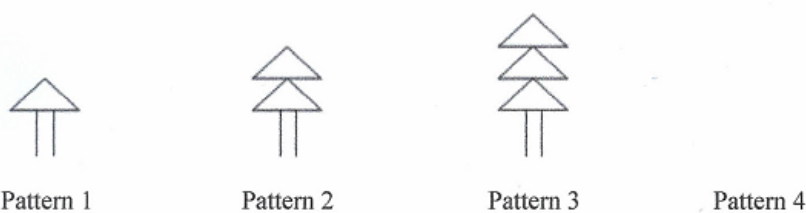
(i) Find the minimum number of trips required to transport all the sorghum.

Answer (b)(i) [3]

- (ii) The trader paid M250 per trip and sold all the bags of dried sorghum to make a profit of 26%.
Calculate the selling price of each bag.

Answer (b)(ii) M [3]

12 The diagram shows patterns formed using rods.



(a) Draw pattern 4. [1]

(b) The table shows the number of rods used and triangle vertices formed in each pattern.

Pattern number	1	2	3	4	5			n
Number of rods	5	8	11		17		38	p
Number of triangle vertices	3	6		12	15		36	q
Complete structure	8		20		32			r

Complete the table. [3]

(c) Find the number of rods in pattern 20.

Answer (c) [2]

(d) Write an expression for r , in terms of p and q .

Answer (d) [1]

(e) How many more complete structures are in pattern number 53 than in pattern number 49.

Answer (e) [2]