

You will be supplied with a sheet of formulae by your Superintendent to help in answering this paper.

AN ROINN OIDEACHAIS
LEAVING CERTIFICATE EXAMINATION, 1995

17163

MATHEMATICS – ALTERNATIVE – ORDINARY LEVEL

PAPER 2 (300 marks)

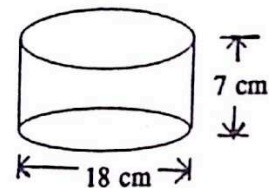
FRIDAY, 9 JUNE – MORNING 9.30 – 12.00

Attempt SIX QUESTIONS (50 marks each)

Marks may be lost if all your work is not clearly shown.

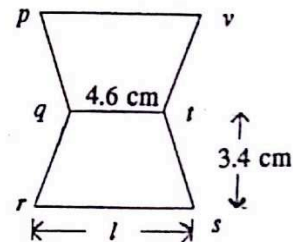


1. (a) Calculate, correct to one place of decimals, the external surface area of a hollow cylinder, without a top or a base, of diameter 18 cm and height 7 cm, if π is taken as 3.14.

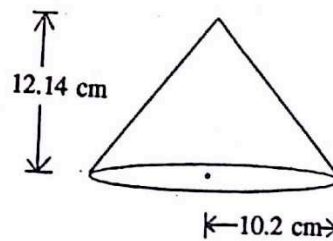


- (b) A disc has an area of 1256 cm^2 . Calculate its diameter d , if π is taken as 3.14.

- (c) The diagram shows two identical trapeziums $pqtv$ and $qrst$ which together make the figure $pqrstv$. Measurements are shown. Find the length, l , if the area of $pqrstv$ is 42.16 cm^2 .



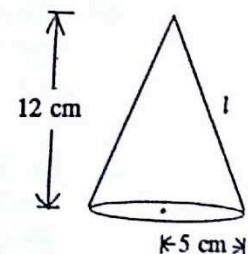
2. (a) Find the volume of a right circular cone of height 12.14 cm and base radius 10.2 cm. Give your answer correct to the nearest cm^3 . Take π as 3.14.



- (b) A hollow right circular cone without a base has radius of 5 cm and height of 12 cm.

(i) Find the slant height l .

- (ii) Find the external surface area of the cone. Give your answer correct to the nearest cm^2 . Take π as 3.14.



- (c) A piece of wax in the shape of a rectangular block ($52 \times 45 \times 12$) cm^3 was melted and reshaped as two right prisms, each of base area 445 cm^2 . One of the prisms was 34 cm high. Find the height of the other prism to one place of decimals.

OVER →

3. (a) A factory makes electric kettles as follows:

Material :	Copper	Aluminium	Plastic
Capacity :	2 litre	1.5 litre	1 litre
Style :	Traditional style	Euro-style	

Calculate how many different types of kettles the factory makes.

- (b) 800 customers bought items in a computer shop. They paid as follows:

Purchase Item	PC	Laptop	Modem
Paid by cash	241	142	52
Paid by cheque	137	88	34
Paid by credit card	23	56	27

What is the probability that a customer picked at random

- (i) paid by credit card to buy a PC ?
 (ii) paid by cash ?
 (iii) did not buy a modem ?
- (c) Susan (17), Michael (18), Grainne (18), Sarah (16), Sam (17), Martin (17), Mary (18), Gary (16) and Gbnait (17) are a group of students whose names and ages are given.

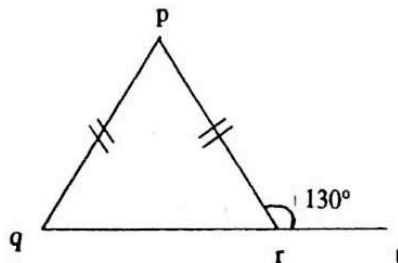
Each student takes a piece of card and writes on it the first letter of his or her name together with his or her age. For example, Susan writes: S 17.

The cards are put into a bag and one is picked at random.

What is the probability that

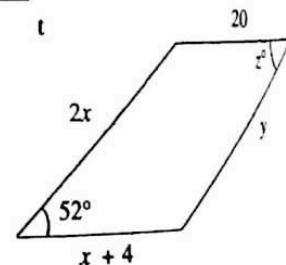
- (i) the card has the letter S written on it ?
 (ii) the card has the letter S or a number greater than 16 on it ?

4. (a) pqr is an isosceles triangle with $|pq| = |pr|$.
 If $|\angle prt| = 130^\circ$, find

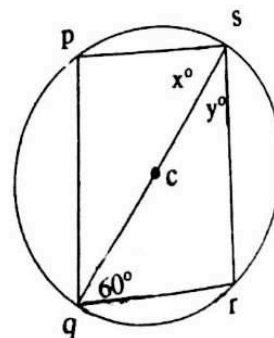


- (i) $|\angle qrp|$
 (ii) $|\angle rpq|$.

- (b) The parallelogram is as shown.
 Find the value of x , of y and of z .



- (c) The circle shown has centre c .
 The lines ps and qr are parallel
 and $|\angle sqr| = 60^\circ$.



Find

- (i) $|\angle qps|$
 (ii) the value of x and the value of y .

5. (a) $p(3, 4)$ and $t(-1, 5)$ are points.

Find

- (i) the coordinates of m , the midpoint of $[pt]$.
- (ii) $|pt|$, correct to one place of decimals.

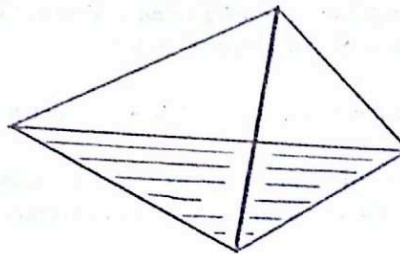
(b) The following results of an experiment in heating were noted:

Time, x in seconds	0	10	20	30	40
Temperature, y , in $^{\circ}\text{C}$	33	35	40	49	53

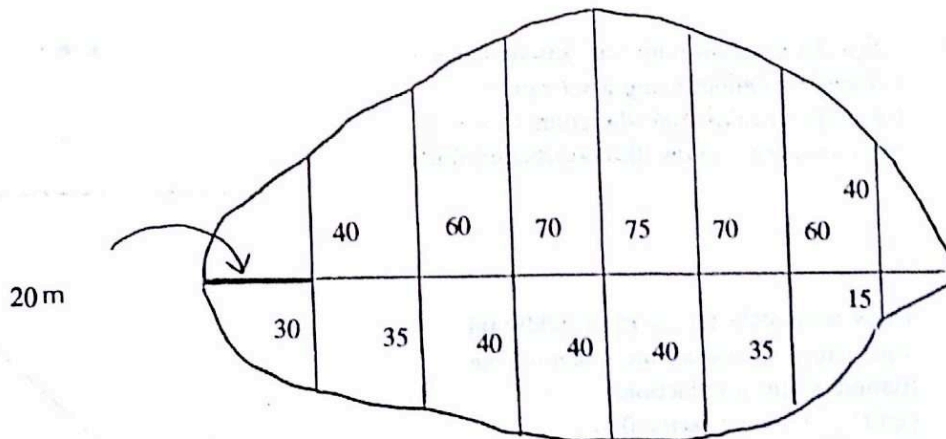
- (i) Plot the points (x, y) on graph paper.
- (ii) Join points $(10, 35)$ and $(40, 53)$ by a line.
- (iii) Find the slope of this line.
- (iv) Write down the equation of the line.

Use the equation, or otherwise, to estimate the temperature, y , when the time, x , is 60 seconds.

6. (a) Sketch the net of the closed pyramid in the diagram if all the edges are of equal length. [The base is shaded].



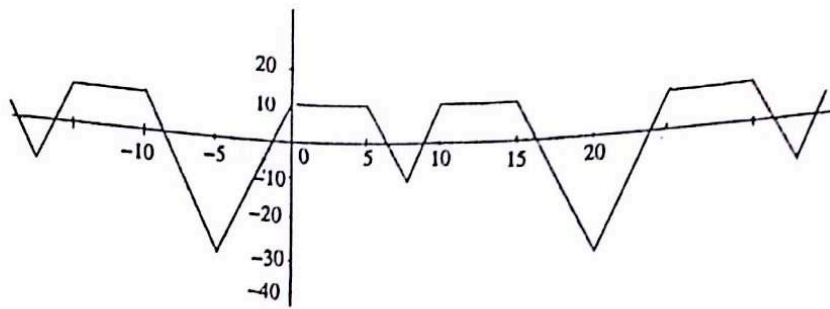
(b) An aerial photograph is taken of some flooded farmland.



Use Simpson's Rule to estimate the area of the flooding to the nearest square metre. The measurements in metres are marked on the picture for your use. The offsets are at intervals of 20 m.

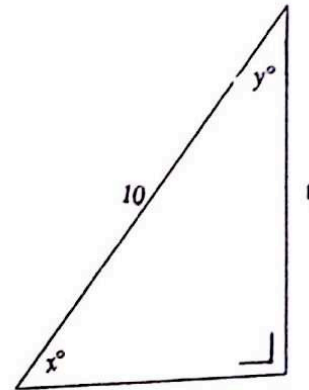
OVER →

7. (a) Part of the graph of a periodic function is shown in the diagram. What is the period and the range of the function ?



- (b) If $\sin x^\circ = 0.8$, calculate the length t .

Find the value of $\cos y^\circ$.



- (c) At a point on level ground 260 m from the foot of a tower the angle of elevation of the top of the tower is 10.9° .

Find the height of the tower, correct to the nearest metre.

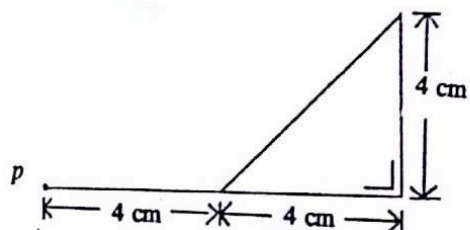
If the point was twice as far away from the foot of the tower on level ground, calculate the angle of elevation, correct to one decimal place.

8. (a) Copy the diagram into your answer book.
Construct, without using a set-square, the perpendicular from the point s to the given line. Show all construction lines.

$s \bullet$



- (b) Draw accurately the diagram below on your page. Construct the image of the triangle under a reduction, centre p , of scale factor 0.5. Calculate the area of the image triangle.

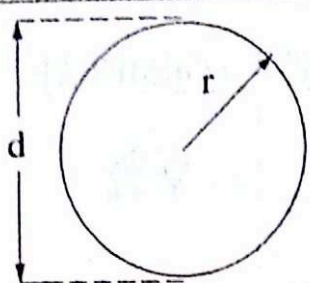



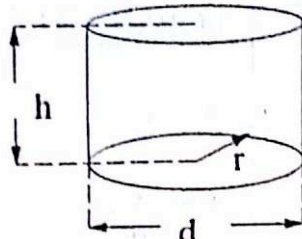
- (c) A map is enlarged by a scale factor of 5.2.

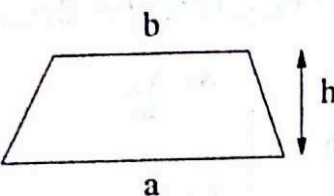
If the original map had area 250 cm^2 , find the area of the enlargement.

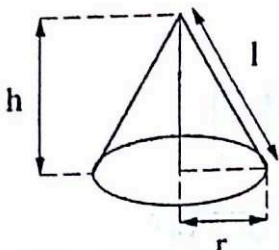
If two towns were 7 cm apart on the original map, what will be the new length apart on the enlarged map ?

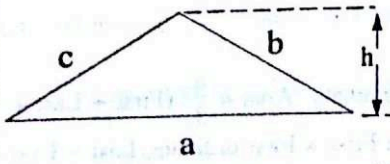
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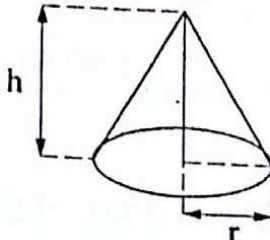
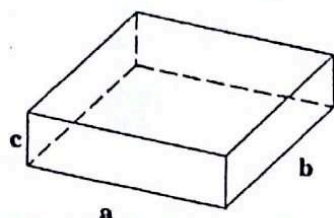
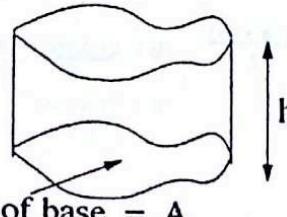
DISC	AREA	FORMULAE
	 <p>Area = πr^2 Area = $\frac{\pi d^2}{4}$</p>	$r = \sqrt{\frac{\text{Area}}{\pi}}$ $d = \sqrt{\frac{4(\text{Area})}{\pi}}$

CYLINDER	AREA	FORMULAE
	<p>Area = $2\pi r h$ Area = $\pi d h$</p>	$r = \frac{\text{Area}}{2\pi h}$ $h = \frac{\text{Area}}{2\pi r}$ $d = \frac{\text{Area}}{\pi h}$ $h = \frac{\text{Area}}{\pi d}$

TRAPEZIUM	AREA	FORMULAE
	<p>Area = $\frac{h(a+b)}{2}$</p>	$a = \frac{2(\text{Area})}{h} - b$ $b = \frac{2(\text{Area})}{h} - a$ $h = \frac{2(\text{Area})}{(a+b)}$

RIGHT CONE	AREA	FORMULAE
	<p>Area = $\pi r l$ Note: $l^2 = r^2 + h^2$</p>	$r = \frac{\text{Area}}{\pi l}$ $l = \frac{\text{Area}}{\pi r}$

TRIANGLE	AREA	FORMULAE
	<p>Area = $\frac{ah}{2}$</p>	$a = \frac{2(\text{area})}{h}$ $h = \frac{2(\text{Area})}{a}$

RIGHT CONE	VOLUME (V)	FORMULAE
	$V = \frac{\pi r^2 h}{3}$	$r = \sqrt{\frac{3V}{\pi h}}$ $h = \frac{3V}{\pi r^2}$
RECTANGULAR BLOCK	VOLUME (V)	FORMULAE
	$V = abc$	$a = \frac{V}{bc}$ $b = \frac{V}{ac}$ $c = \frac{V}{ab}$
RIGHT PRISM	VOLUME (V)	FORMULAE
 <p>Area of base = A</p>	$V = Ah$	$A = \frac{V}{h}$ $h = \frac{V}{A}$

Midpoint formula:

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Distance Formula:

$$\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

Slope Formula:

$$\frac{y_2 - y_1}{x_2 - x_1}$$

Equation of a line:

$$y = mx + c \quad \text{or} \quad y - y_1 = m(x - x_1)$$

Simpson's Rule:

$$\text{Approximate Area} = \frac{h}{3} (\text{First} + \text{Last} + \text{T.O.F.E.})$$

where First = First ordinate, Last = Last ordinate

T.O.F.E. = Twice the sum of the Odd ordinates +
Four times the sum of the Even ordinates.

h = the interval