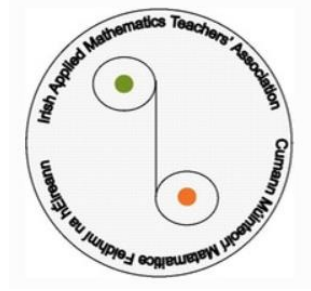


"IAMTA Junior Problem Solving Competition"

Answer each Question

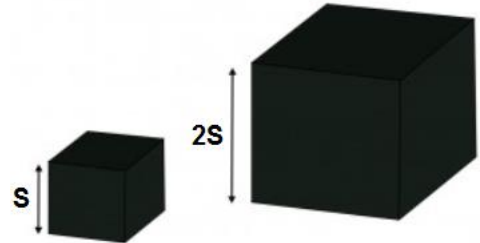


**SAMPLE**

ROUND 1

Q1

Two solid cubes are made from the same material. One cube has sides that are 2 times as long as the other. When placed on one side, the small cube exerts a pressure  $p$  on the ground. If one area of each side of the small cube is  $A$ , determine the pressure exerted by the large cube standing on one of its faces.



Q2

Lamar Gant, U.S. powerlifting star, became the first man to deadlift five times his own body weight in 1985. Deadlifting involves raising a loaded barbell from the floor to a position above the head with outstretched arms. Determine the work done by Lamar in deadlifting 300 kg to a height of 0.90 m above the ground.

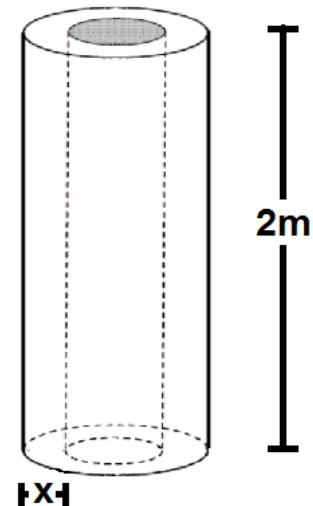
Q3

While in training, Jerome runs up a stairs, elevating his 102 kg body a vertical distance of 2.29 meters in a time of 1.32 seconds at a constant speed.

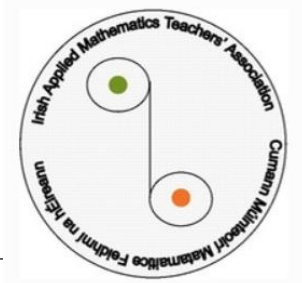
Determine the power generated by Jerome.

Q4

Find the thickness  $x$  of the hollow cylinder of height 2 m if the volume between the inner and outer cylinders is equal to  $1.155 \times 10^5 \pi \text{ mm}^3$  and the outer diameter is 16 mm



**SAMPLE**

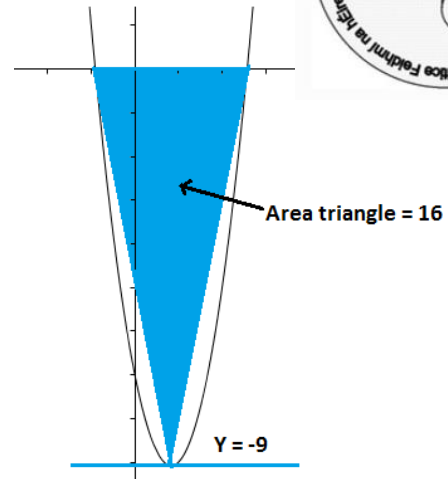


ROUND 2

Q1

Find the equation of the quadratic shown.

Given that area of given triangle = 16 square units and one of the roots is  $X=3$



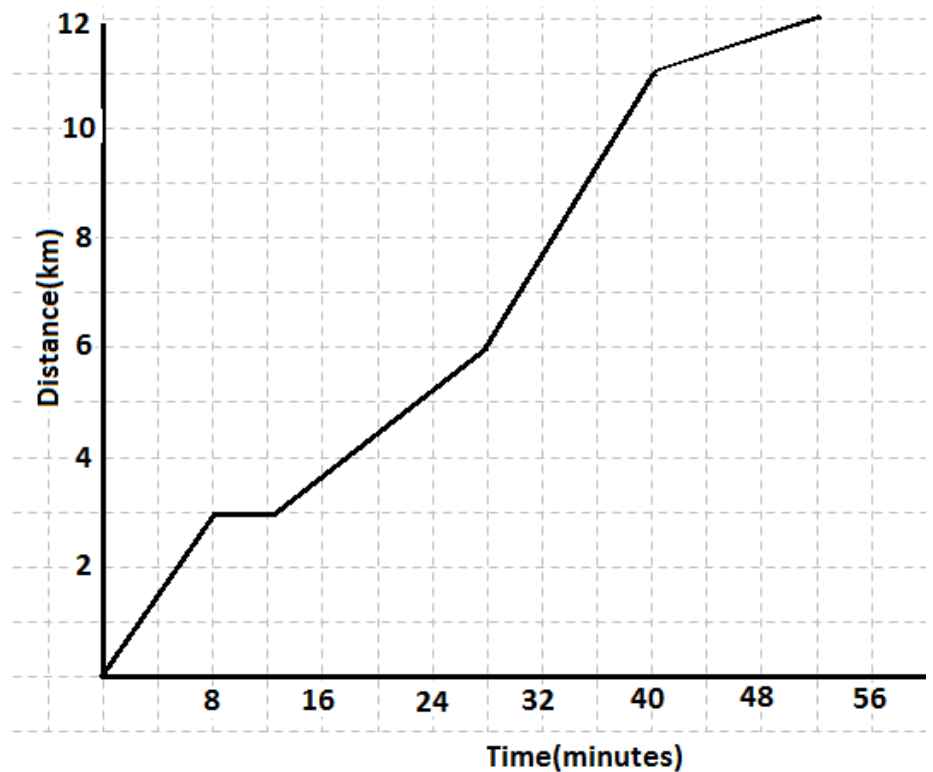
Q2

Evaluate  $\frac{X^2 + X - 6}{X^2 - 9}$  when  $X = -3$

Q3

The given graph represents the distance a motor cyclist must travel to work.

Calculate the average speed for the whole distance, including the four minute stop he makes to buy his newspaper.



Q4

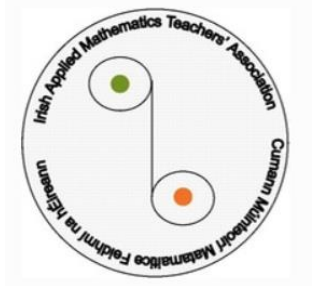
Solve the simultaneous equations

$$x^2 + y^2 = 5$$

$$y = 3x + 1$$

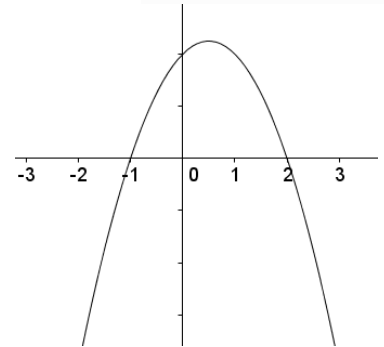
ROUND 3

**SAMPLE**



Q1.

Calculate the maximum point of the quadratic graph, represented here.



Q2.

$S(t) = -3t^2 + 13t - 4$  represents the height an object is above the ground  $\frac{1}{3} \ll t \ll 4$

Find the time(s) when the object is 5m above the ground. Leave your answer correct to 1 decimal place.

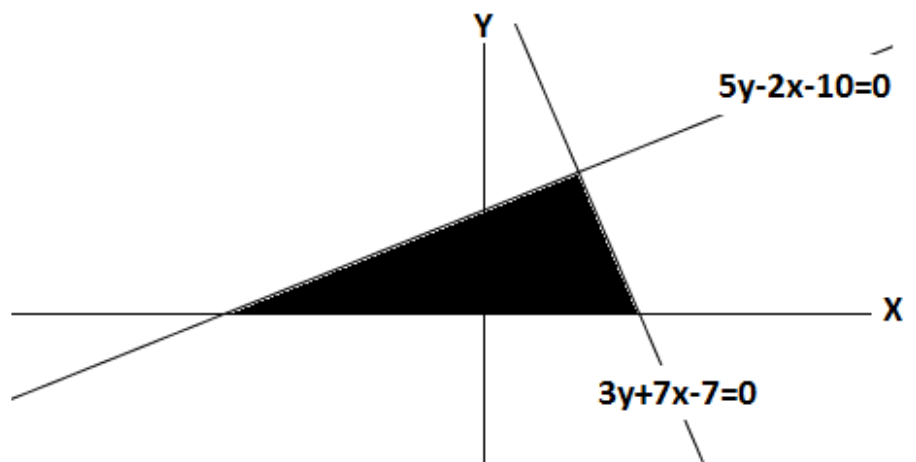
Q3.

If the relative density of an irregular shaped solid object is 1.9 and its weight is 25N, calculate the volume of water it displaces in millilitres.

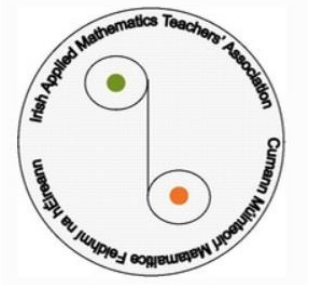
[Density of Water is  $1000 \text{ kgm}^3$  ]

Q4.

Calculate the area of the shaded region trapped between the X-axis, the line  $5y-2x-10=0$  and the line  $3y+7x-7=0$



**SAMPLE**



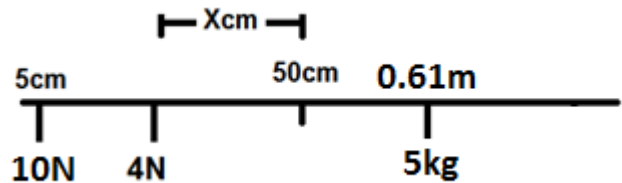
ROUND 4

Q1

A man in a boat sets out on a course  $30^\circ$  East of North of Barna Pier at  $3\text{ms}^{-1}$ . It continues at this speed in this direction for 30 minutes. He then stops the boat and takes his bearings. He notices that the pier is 4.2 km south west of his position. He decides that a current must have caused the new positional change. Calculate how much the current has adjusted his position. Leave your answer to the nearest metre.

Q2

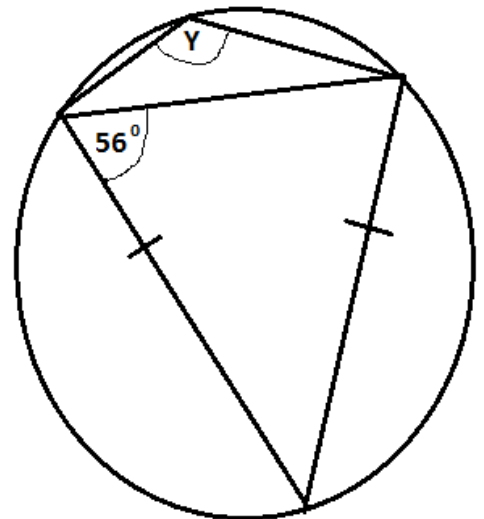
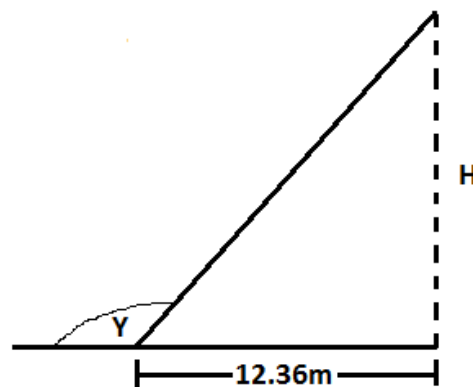
Find the value of X if the metre stick is balanced.



Q3

Using both diagrams supplied, Calculate H.

Leave answer correct to one decimal place.



Q4

Two men, of exactly the same height, on the same side of a tall building, notice that the angle of elevation to the top of the building to be  $30^\circ$  and  $60^\circ$  respectively. If the height of the building is known to be 60m, find the distance between the two men, in metres correct to one decimal place.