The π Quiz 2010

Round 1

1.

A (-2, 1) and B (-4, 3) are 2 points. Find the co-ordinates of point C, so that B is the midpoint of AC.

2.

Solve the following equations for x and y

$$2x - y = 2(y - x)$$

$$\frac{x}{3} + \frac{y}{4} = 2$$

Round 2

1.

Solve for x

$$\frac{2}{4x-6} - \frac{2}{4x+6} = \frac{6}{7}$$

2.

Find Sin A, in surd form.
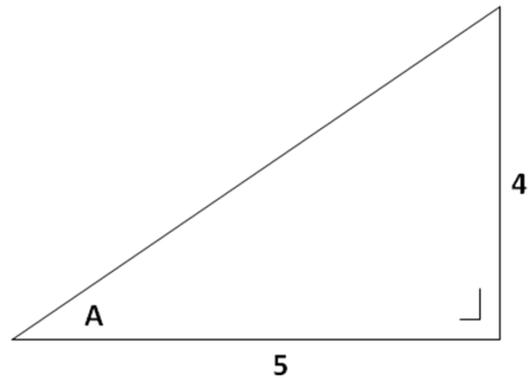
Round 3

1.

A red closed solid cone has a slant height of $\sqrt{29}$ cm. The base radius is 2cm. Find the volume of the cone, correct to 2 decimal places and giving the units. [Take π = 3.14]

2.

140 teenagers were asked about which games consoles they liked the most.
60 liked the xbox, 52 liked the PS3 and 56 liked the wii.
24 liked both the xbox and ps3,
16 liked both the ps3 and the wii,
while x liked the xbox and wii only.
8 teenagers liked all three consoles.
Twice as many didn't like any games console as those who like the xbox and the wii only.
Find the number of teenagers who like the xbox only.

Round 4

1.

A survey was carried out of the number of visits members of a gym made to their gym in a year.

Number of Visits	0-10	10-20	20-40	40-80	80-110
Number of Members	12	x	20	28	24

[Note: 10-20 means 10 visits or more but less than 20 visits]

Taking mid-interval values, it was found that the mean numbers of visits was 48.6 visits. Find the value of x.

2.

Pat earned €40,000 in 2009. His standard rate cut off point is €33,000 while his tax credit is €4,800. The lower rate of tax is 20% and the higher rate is 40%.

However, Pat actually paid the Government €1,200 for his taxes and they are not happy as they have realised he has not paid enough. They have issued Pat with a bill for the remainder of the money he owes and have added on interest at 7.5% on the amount he owes. They also added 52c onto the total for the stamp on the letter.

Calculate exactly how much Pat owes the Government.

Round 5

1.

€1,750 lottery prize was won by a group of 6 people. They must pay tax on this money at a rate of 17.5%, and then pay €100 for a minibus to collect their winnings and then divide up the total between them.

However, a solicitor is hired to oversee the splitting up of the money and charges 1% of the money after all the costs but before it is divided up.

Find out how much each person actually gets, to the nearest euro.

2.

On the first week of the month, a number of people entered a draw where the prize was €3,000. The second week, 5 more people joined the group and they won it again but each person received €50 less this time. Find out how many winners were there on the second week.

3.

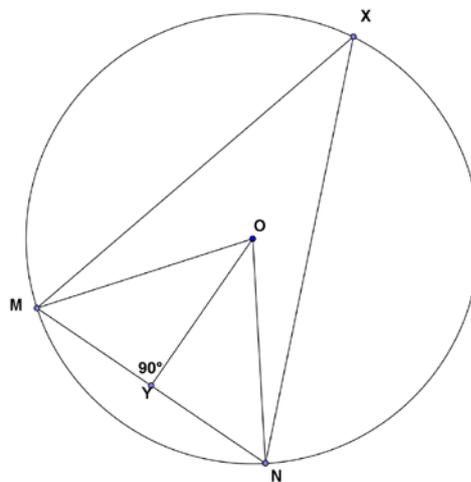**g is a function such that $g(x) = ax^2 + bx + 1$; g(1) = 0 and g(2) = 3.**

If (t, t+1) is a point on g(x), find t where $t \in \mathbb{N}$ and $t \neq 0$

4.

A Circle with centre o, has chords [MN], [MX] and [NX].

The length of [MN] is 8cm. Y is a point on [MN] and OY is perpendicular to MN.

If the area of the triangle OMN is 12 cm², calculate the radius of the circle, giving units.

Round 6

1.

The line g passes through the point (3,1) and is perpendicular to the line $4x - 2y - 1 = 0$.

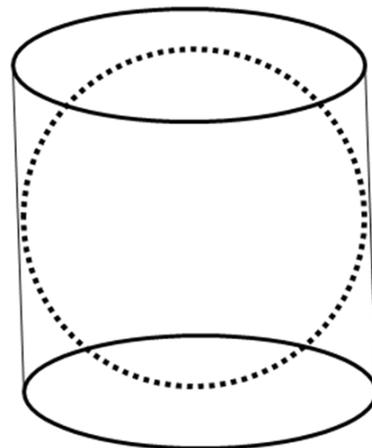$5x - 4y = 18$ is the equation of the line k. Find the co-ordinates of the point of intersection of g and k.

2.

Find the value of x when $5^{2x\text{-}3} = \sqrt[3]{125}$

3.

A sphere fits exactly inside a cylindrical container as shown. The volume of the sphere is 972π cm³.

Express the volume of the empty space as a percentage of the total volume of the sphere.

4.

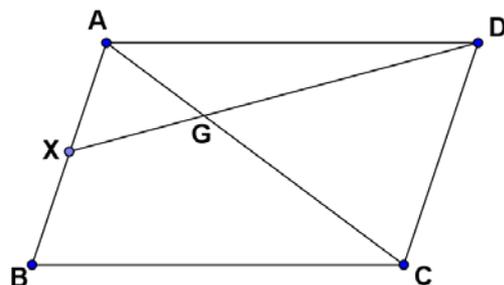ABCD is a parallelogram.

|AB|=6cm, |AG|=4cm and |GC|=8cm.

Find |AX|, giving units.

Round 7

1.

The mean age of 5 scouts sitting around a camp fire is 15 years. A scout leader sits down with her guitar and joins the scouts for a song. The mean age of the people around the camp fire is now 21 years. Calculate the scout leader's age.

2.

Lorraine invests €6,000 in her bank for 3 years compound interest at a rate of 4.5% p.a. At the end of the first year, she withdraws €1,500 and at the end of the second year, she withdraws another €1,500. If she must pay tax at a rate of 20% on the interest, how much does she have in the bank at the end of the 3rd year, to the nearest euro?

3.

In the triangle PQR, |QR|=18cm, |<PQR|=32° and |<QRP|=96°.

If PS is the bisector of |<QPR|, calculate |PS|, correct to one decimal place and giving units.
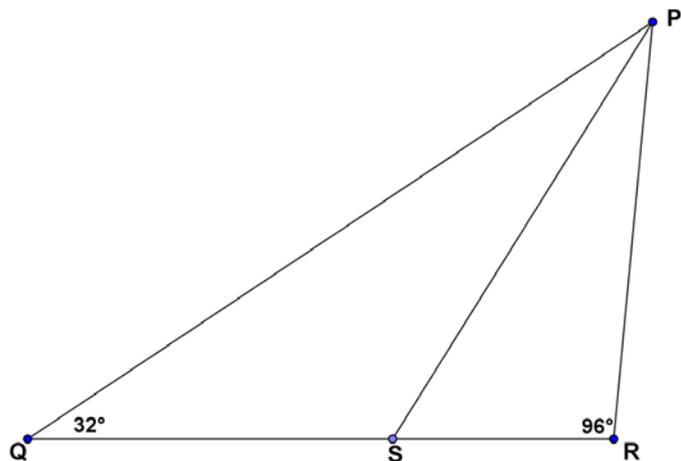
4.

Calculate the area of the triangle formed by the x axis, the y axis and the line 3x = 6 + y

Round 8

1.

m is the line 3x + ky = 11. The line m is perpendicular to the line z: 4x – 3y = 27½.

Find the coordinates of the point where m cuts the y axis.

2.

h is a function such that h(x) = x^2 +x + q. If h(-3) = 0, solve the equation h(x+5) = 0.

3.

Two buildings, A and B stand on the same horizontal ground. The smaller building, A, is 25m high. The angle of elevation of the top of the building A from the foot of building B is 32°.
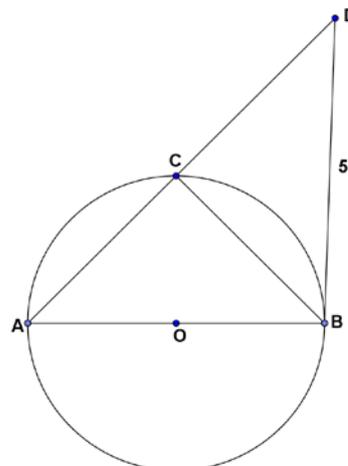
If building B is 76.2m high, calculate |<Q|, the measure of the angle of elevation of the top of building A from the top of building B to the nearest degree.
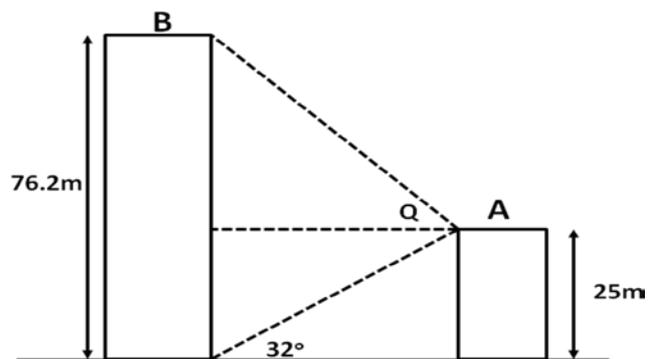
4.

The circle with centre O, contains the points A, B and C. DB is a tangent to the circle at B and |AC|=|BC|. |DB|=5cm and the points A, C and D are collinear.

Calculate the radius of the circle, giving units.

Round Number	Question 1	Question 2	Question 3	Question 4
1	(-6, 5)	x=3, y=4		
2	+2 and -2	$\dfrac{4}{\sqrt{41}}$		
3	20.93cm^3	24		
4	16	€3655.52		
5	€222	20	t=2	Radius=5cm
6	(4, ½)	x=2	50%	3cm
7	51	€3513	14.2cm	6 (units not marked)
8	$(0,\dfrac{11}{4})$	x=-3 and -8	52°	2.5cm