The π Quiz 2011 – Round 1

Irish Maths Teachers Association, Cork Branch

Q1. In a right angled triangle, one of the acute angles is five times as large as the other acute angle. Find the measure of the bigger of the two acute angles.

Q2. A woman dies. She leaves €12,000 which is to be divided between three parties as follows:
- ➢ her husband is to receive two-thirds of the money
- ➢ her son is to receive one-fifth of what his father receives
- ➢ the remainder is to be given to a charity.

How much money does the charity receive?

The π Quiz 2011 – Round 2

Irish Maths Teachers Association, Cork Branch

Q1. John has an important business meeting in Galway. He intends to take the 10.30 a.m. Cork to Galway train. The train is delayed and leaves Cork 20 minutes late. The train then travels a distance of 135 km at an average speed of 60 km/h. What time does John eventually arrive in Galway?

Q2. Solve for *x:*
$$\frac{x+1}{x-2} - \frac{x+2}{x-1} = \frac{1}{2}$$

The π Quiz 2011 – Round 3

Irish Maths Teachers Association, Cork Branch

Q1. l is the line $3x + 2y - 4 = 0$.
Line k contains the point (-1, -3) and has the equation $2x - 3y + c = 0, c \in \mathbb{Z}$.
Find the point of intersection of lines l and k.

Q2. 60 people were surveyed.
23 had visited America.
36 had visited Britain.
22 had visited France.
10 had visited America and Britain.
9 had visited America and France.
4 had visited none of these places.
4 had visited all three places.
x had visited France and Britain but not America.
How many had visited only one place?

The π Quiz 2011 – Round 4

Irish Maths Teachers Association, Cork Branch

Q1. The mean age of the six students in a 'speech and drama' class is 10 years and nine months. When a new student joins the class the mean age drops to 10 years and three months. Calculate, in years and months, the age of the new student.

Q2. Emily sells her motorbike and gets €3,000 from the sale. She invests it in a bank account which has a rate of 3% p.a. if she has at least €3,000 in the account. The rate is only 2.5% p.a. if there is less than €3,000. The bank charges €20 for each withdrawal within the first 3 years of opening the account.
At the start of the second year, Emily buys a Gucci handbag for €800 so she withdraws this amount. How much will she have in her account at the end of the third year to the nearest cent.

The π Quiz 2011 – Round 5

Irish Maths Teachers Association, Cork Branch

Q1. Solve the simultaneous equations:

$$3x - 2y = y - 6x$$
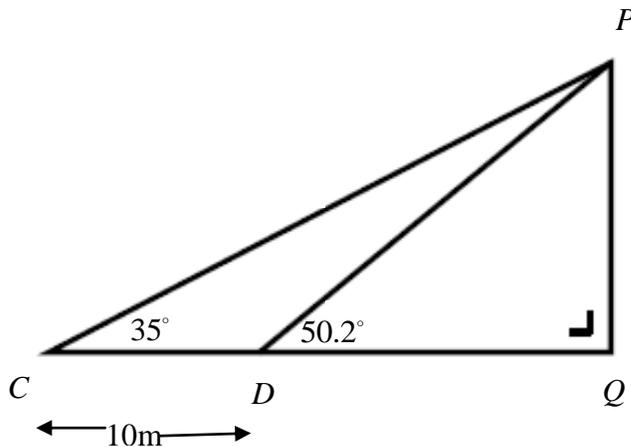
$$\frac{5x - 3y + 2}{2} = \frac{x - 2y + 4}{3}$$

Q2. A and B are two sets. There are 20 elements in A and 15 elements in B.
What is least possible value of AUB?

Q3. A solid sphere of wax of radius 9 cm is melted down and recast into solid cones
of radius 3 cm and height 18 cm.
Calculate the number of cones that can be made.

Q4 A mast, $[PQ]$, is erected to support a television aerial. The mast is upheld by two
cables.
The angle of elevation of cable $[PC]$ to the top of the mast is $35°$ and of cable
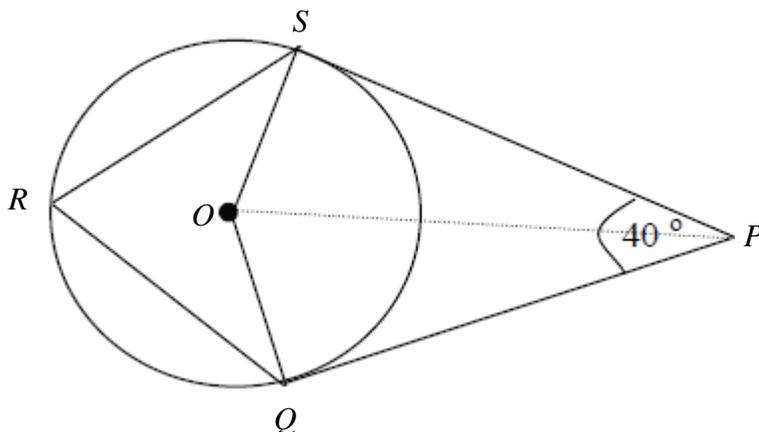cable $[PD]$ is $50.2°$ where $|CD| = 10\,\text{m}$.
Calculate the height of the mast, $[PQ]$, to the nearest metre.

The π Quiz 2011 – Round 6

Irish Maths Teachers Association, Cork Branch

Q1.   A group of girls club together to buy a birthday present for Michelle which costs €160. When four extra girls ask to join in, the cost per person decreases by €2. Find the original number of girls.

Q2.   John has decided that he wants to propose to Poppy, his girlfriend. He wants to make the occasion special but has little money. He sees that a platinum engagement ring has different prices in different countries due to the VAT. He discovers that Switzerland will be the cheapest place for him to purchase the ring so he brings Poppy on holidays. He sends her to the museum while he strikes a bargain. The jeweller has a ring at 4500CHF. However the jeweller must adjust the size for Poppy which she charges at 40 CHF per hour. It takes her half an hour. There is VAT at 21% on the price of the ring and 13% on the work the jeweller does. John then wants it gift wrapped which is a further 3.75CHF and a red shiny bag for 3CHF, both with no VAT. John pays with his credit card which will convert the Swiss Francs into Euro at a rate of 1.28 CHF = €1. Find out how much John will see on his credit card bill in euro, to the nearest cent.

Q3.   A cylinder had radius x and height $3x$. Another cylinder has three times the radius and twice the height of the first cylinder.
Find the ratio of the volume of the second cylinder to the volume of the first.

Q4   In the diagram, O is the centre of a circle.
Calculate $|\angle QRS|$ given that $|\angle QPS| = 40°$.
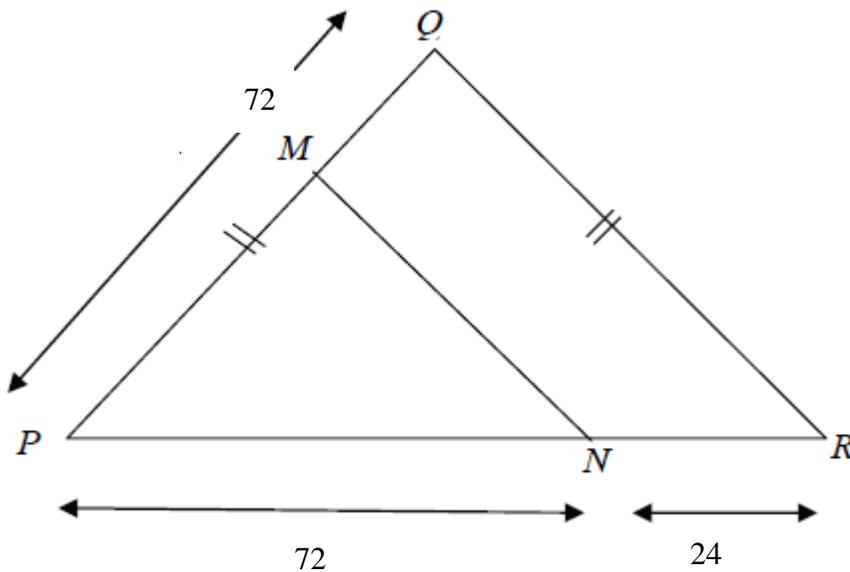
Q1. $h : x \rightarrow ax^2 + bx + 3$

If $h(-1) = 0$ and $h\left(\dfrac{1}{2}\right) = 6$, find the value of a and b.

Q2. Solve for x: $2^{x-1} = \dfrac{32}{\sqrt{8}}$

Q3 $[MN]$ is parallel to $[QR]$ and the triangle PQR is isosceles with $|PQ| = |QR|$.

$|PQ| = 72\,\text{cm}, |PN| = 72\text{cm}, |NR| = 24\,\text{cm}.$

Express the area of the quadrilateral $MQRN$ as a percentage of the area of the triangle PQR , give your answer correct to one decimal place.
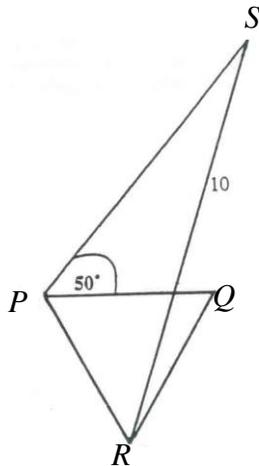

Q4 $C = (w, 2.5)$ is a point on the perpendicular bisector of $[AB]$ where $A = (2, 5)$ and $B = (4, 2)$. Find the value of w.

The π Quiz 2011 – Round 8

Irish Maths Teachers Association, Cork Branch

Q1

PQR is a triangle such that
$|PQ| = |QR| = |RP|$.
The area of the triangle *PQR* is 6.928 square units, $|\angle SPQ| = 50°$ and $|SR| = 10$.

Calculate $|\angle PSR|$ correct to the nearest degree.

Q2. Soup is contained in a cylindrical saucepan which has internal radius of length 14 cm. The depth of the soup in the saucepan is 20 cm.
A ladle in the shape of a hemisphere with internal radius of length 6 cm is used to serve the soup.
The soup is served into cylindrical cups. One ladleful is placed in each cup.
How many cups can be completely filled from the contents of the saucepan if each cup must contain exactly one full ladle?

Q3 Fully factorise $(8x + 4a)(2x - a) - (3y - a)(12y + 4a)$

Q4 Liz is a massive fan of GLEE and loves to hear Kurt sing. When she heard about the show in the O2 in July, she persuaded eight friends to hire a bus with her. The cost of the bus is going to be €134 plus €2.13 per km. The cost of the driver is €30.42 per hour the bus is hired plus the driver must receive expenses of €23.75 to cover meal costs. The journey is 376 km in total while the total time the bus is on hire is 10 ½ hours. How much will the bus trip cost each person to the nearest euro?

The π Quiz 2011 – Tie –break

Fill answers onto question page.

Irish Maths Teachers Association, Cork Branch

Q1   The distance of the planet Neptune from the sun is approximately 4.5×10^9 km. Given that the speed of light is 3×10^5 km/s, find in minutes, the time take for light to travel from the sun to Neptune. _____

Q2.   Form the quadratic equation whose two roots are $0, \dfrac{7}{3}$ _____

Q3   The base of a rectangular tank measures 140cm by 110cm. The tank holds 1386 litres. A cylindrical tank has the same height and the same capacity as the rectangular tank. Calculate the radius in cm, of the cylindrical tank. _____

Q4   If one tap can fill a bath in 4 minutes and another tap can do so in 6 minutes, how long will it take to fill the bath when they are both pouring simultaneously? Give your answer in minutes and seconds. _____

Answers

	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8
Q1	$75°$	13.05pm	(2,-1)	7yrs& 3mths	x =-1 y = -3	16	a = 2 b = 5	$22°$
Q2	€2,400	x =-1, 4	35	€2,384.92	20	€4,276.84	$x = \dfrac{9}{2}$	27
Q3					18	18:1	43.8%	4(2x +3y)(2x-3y)
Q4					17m	$70°$	1.5 or $\dfrac{3}{2}$	€142

Tiebreak

Q1   250 minutes

Q2 $3x^2 - 7x = 0$

Q3   70cm

Q4   2 minutes 24 seconds