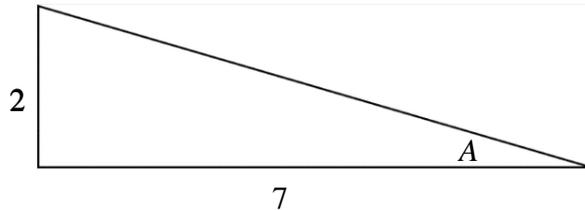


The π Quiz 2013 – Round 1

Irish Maths Teachers' Association, Cork Branch

Q1.



For the right angled triangle shown above, find $\sin A$ in surd form.

Q2. If $t = \sqrt{\frac{x}{y-2}}$, express y in terms of t and x .

The π Quiz 2013 – Round 2

Irish Maths Teachers' Association, Cork Branch

Q1. Simplify, and hence, factorise:

$$(3x - 2y)^2 - y(5y - 12x).$$

Q2. Jane inherited some money when her Granny died. She decided to buy a shiny new black car but unfortunately Jane isn't a good driver and it wasn't long before the car's clutch gave up. The new clutch cost €1,345 and labour costs of €450 to fit. VAT is charged at 21 % for the part and 13 % for the labour. However as a goodwill gesture, the garage decided to pay 25 % of the cost of the part and 50 % of the labour cost before VAT. Jane forgot to pick up her car for an extra week so the garage had to charge her €5.45 per day for 7 days. No VAT is payable on this charge. Find out how much Jane owes the garage to the nearest euro.

The π Quiz 2013 – Round 3

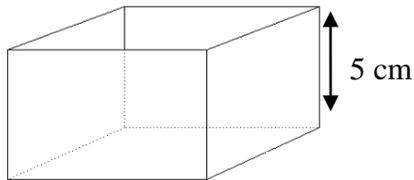
Irish Maths Teachers' Association, Cork Branch

- Q1.** $h(x) = 2x + a$ and $k(x) = ab - 5x$ are two functions defined on R , where a and b are real numbers.
If $h(1) = -5$ and $k(-1) = -2$, find the value of a and the value of b .
- Q2.** $A = (2, 5)$, $B = (-1, 1)$ and $C = (6, 2)$.
Find the equation of the line k through A which is perpendicular to BC . Give your answer in the form $px + qy + r = 0$ where $p, q, r \in Z$.

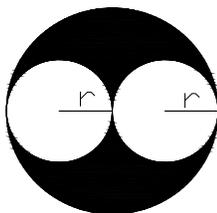
The π Quiz 2013 – Round 4

Irish Maths Teachers' Association, Cork Branch

- Q1.** A closed rectangular box has a square base. The height of the box is 5 cm.
The total surface area of the box is 288 cm^2 . Find the area of the square base.



- Q2.** Two circles, each with radius of length r , fit exactly inside a larger circle.



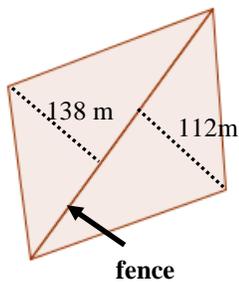
Express the area of the shaded region as a percentage of the area of the larger circle.

The π Quiz 2013 – Round 5

Irish Maths Teachers' Association, Cork Branch

Q1. Factorise fully:
 $x^3 + 2x^2y - xy^2 - 2y^3$.

Q2.



A four sided field of area 3 hectares has a fence joining 2 opposite corners as shown in the diagram. The perpendicular distances from the other 2 corners to the fence are 138 m and 112 m, respectively. (1 hectare = 10,000 m²)

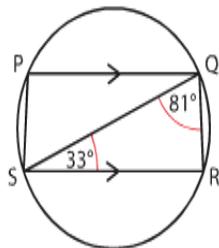
Find the length of the fence in metres.

Q3. The table below shows the distances rolled by 7 marbles after they were released.

Marble	1	2	3	4	5	6	7
Distance rolled (mm)	188	200	250	30	380	330	302

Marble 4 is released again and the distance it rolls is measured and recorded in place of the original measurement. The median of the data remains unchanged and the mean is now equal to the median. How far did marble 4 roll the second time?

Q4.



$PQRS$ is a cyclic quadrilateral with PQ parallel to SR .

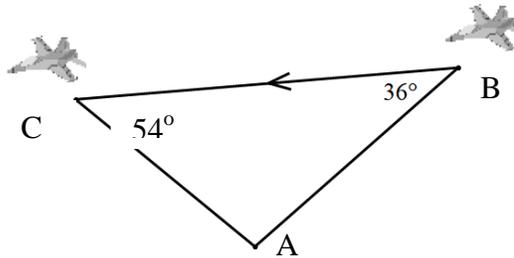
$|\angle QSR| = 33^\circ$ and $|\angle SQR| = 81^\circ$.

Find $|\angle SPQ|$.

The π Quiz 2013 – Round 6

Irish Maths Teachers' Association, Cork Branch

- Q1.** Ann spent €7.20 when buying a number of identical pens. If each pen had been 4 cent cheaper, then she could have purchased an extra 2 pens for her €7.20. Find the number of pens she purchased originally.
- Q2.** Eamon decides to bring his wife on a surprise trip to Poland. On arrival, he takes out 600zł from a money exchanger with an exchange rate of 3.86zł = €1. After visiting some tourist attractions, Eamon decides to treat his wife to dinner in a fancy restaurant which costs 80zł. He pays using his debit card which has an exchange rate of 3.98zł = €1. The following morning, he has run out of money so he uses a different money changer where he changes €25 at an exchange rate of 3.75zł = €1. Unfortunately he was mugged walking down the street and they steal his money so he has to go back to the same money changer where he gets 400zł. They spend every last penny when he gets a phone call that his daughter is competing in the π Quiz so he gets a free lift to the airport and buys a flight home which costs 410zł each on his debit card which now has an exchange rate of 3.83zł = €1. Calculate how much the holiday costs Eamon in euro. Give your answer correct to the nearest euro.
- Q3.** B and C are two airports observed from the point A .



- It takes a plane 25 minutes travelling at a speed of 384 km/h to go from airport B to airport C . Find the distance in km airport C is from the point A . Give your answer correct to 2 decimal places.
- Q4.** A cylindrical metal pipe is 3 m long. It has an external diameter of 22 cm and an internal diameter of 20 cm. A solid sphere has a volume equal to three times the volume of metal in the pipe. Calculate the radius of the sphere in cm correct to the nearest whole number.

The π Quiz 2013 – Round 7

Irish Maths Teachers' Association, Cork Branch

- Q1.** There are 30 pupils in a class. They all study either history, geography or art.
4 study all 3 subjects.
6 study history and geography.
8 study geography and art.
14 study geography.
12 study history.
18 study art.

How many pupils study more than one of the 3 subjects?

- Q2.** A bag contains 4 red beads and 2 blue beads.
A second bag contains 2 red beads and 4 blue beads.
Peter takes one bead at random from each bag.
Find the probability that Peter takes a red bead and a blue bead in any order.
Give your answer as a fraction in its simplest form.

- Q3.** Graph the solution of the following inequality on a number line.

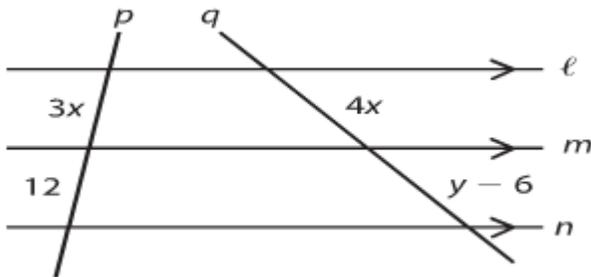
$$\frac{3x-1}{2} + \frac{3-x}{5} > 4, x \in \mathbb{R}.$$

- Q4.** The line l has equation $x - 2y + 6 = 0$. k is the line through $P(0, 6)$ which is perpendicular to l .
 l cuts the x -axis at the point T .
 k cuts the x -axis at the point R .
Calculate the area of the triangle PTR .

The π Quiz 2013 – Round 8

Irish Maths Teachers' Association, Cork Branch

- Q1.** Brenda needs to travel to Dublin for a meeting. She leaves Cork at 10 am and drives the 240 km to Dublin in her Nissan Tiida, stopping on the way for lunch. She books into the Heuston Hotel at 1 pm for the night at a rate of €89 where she leaves her car which charges 0.70c per hour. She travels by LUAS to the Dublin Office with a €1.50 single journey ticket and attends her meetings. She returns to the hotel at 7 pm on the LUAS and eats dinner before getting an early night. She wakes at 8 am, leaves the hotel and gets the LUAS back to the office where she has more meetings before returning to the hotel by LUAS at noon. She checks out and leaves the car park at 1 pm. She returns to Cork, buying lunch on the way home. She receives 67c per km driven, €6.75 per lunch and €12.54 for dinner. She expects all expenses incurred to be covered by the company. However on returning to her Cork office, she hands in her expenses form to her boss. He gives Brenda only €86.75 to cover her expenses. Brenda knows this is wrong. Find out how much more Brenda should be getting in expenses.
- Q2.** In the given figure, the parallel lines l , m and n cut equal intercepts on the transversals p and q . Find the values of x and y .



- Q3.** $\frac{3^3 \times 81^{\frac{1}{2}}}{27^{\frac{2}{3}} \times 3^5} = 3^n$. Find the value of n , $n \in \mathbb{Z}$.
- Q4.** Michael buys a piece of timber of length 200 cm to make a wheelchair ramp on a step. The height of the step is 60 cm and the ramp must be placed at a slope of $\frac{1}{3}$. Find the length of timber that he has to cut off the original piece of timber in order to make the ramp. Give your answer in cm correct to 3 significant figures.

The π Quiz 2013 – Tie –break 1

Fill answers onto question page.

Irish Maths Teachers' Association, Cork Branch

Q1. The scale on an Ordnance survey map is in the ratio 3 : 100,000.

2 towns F and G are 50 cm apart on the map.

What is the distance of G from F in km correct to 2 decimal places?

Q2. There are 5 green beads and x red beads in a bag. What is the value of x if the probability of drawing a red bead is $\frac{3}{4}$. _____

Q3. Given that $\tan A = 4$, find $\cos A$ in the form $\frac{1}{\sqrt{x}}$, where $x \in \mathbb{N}$.

Q4. $f(x) = 5x^2 + mx - 8$ where $m \in \mathbb{Z}$.

If $f(1) = -9$, find the two values of x for which $5x^2 + mx = mx^2 + 5x$.

The π Quiz 2013 – Tie –break 2

Fill answers onto question page.

Irish Maths Teachers' Association, Cork Branch

- Q1.** A chef gives the following instruction for calculating the amount of time for which a turkey should be cooked:

“Allow 15 minutes per 450 g plus an extra 15 minutes at the end.”

Calculate, using the chef's instruction, the cooking time in hours and minutes for a turkey of 9.9 kg. _____

- Q2.** A piece of rope 10 metres long is made into a rectangle of length x metres and width y metres.

If the area of the rectangle is 5.25 m^2 , find x and y , given that $x > y$.

$x =$ _____ $y =$ _____

- Q3.** A distance of 375 m is travelled in 25 seconds. Find the average speed in km/h.

- Q4.** $E = (5, 2)$, $F = (2, -1)$, $G = (x, 4)$ and $H = (4, x)$ are four points and $|EF| = |GH|$, solve for x . _____

Answers

	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8
Q1	$\frac{2}{\sqrt{53}}$	$(3x+y)(3x-y)$	$a = -7$ $b = 1$	64 cm^2	$(x+y)(x-y)(x+2y)$	18	10	€ 72.69
Q2	$y = \frac{x+2t^2}{t^2}$ or $y = \frac{x}{t^2} + 2$	€ 513	$7x+y-19=0$	50 %	240 m	€ 21	$\frac{5}{9}$	$x = 4$ $y = 22$
Q3					100 mm	94.05 km	$x > 3,$ $x \in \mathbf{R}$ shown on no. line i.e open circle at 3 and continuous line to right	$n = -2$
Q4					114°	24 cm	27 sq units	10.3 cm

Tiebreak 1

Q1 1666.67 km

Q2 $x = 15$

Q3 $\frac{1}{\sqrt{17}}$

Q4 $x = 0, x = 1$

Tiebreak 2

Q1 5 hrs 45 mins

Q2 $x = 3.5, y = 1.5$

Q3 54 km/h

Q4 $x = 1, x = 7$

