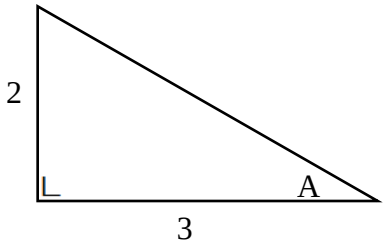
The π Quiz 2018 – Round 1

Irish Maths Teachers' Association, Cork Branch

Q1. Write $\cos A - \sin A$ in surd form.



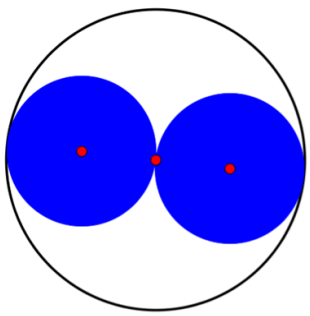
Q2. Use factors to simplify the following: $\dfrac{2x^2+4x}{2x^2+x-6}$.

The π Quiz 2018 – Round 2

Irish Maths Teachers' Association, Cork Branch

Q1. Harry and Jane are having trouble with their kitchen and need to replace it. They pay a builder €500 + VAT of 13% for clearing out the old kitchen and skip hire of €300 + VAT of 22%. The new kitchen costs €7000 + VAT of 22%, tiles cost €8 + VAT of 13% per square metre. The kitchen is 15 square metres. The tiler costs €15 + VAT of 13% per hour, he can complete the tiling in 9.5 hours. The appliances cost €2000 which includes the VAT. How much does their new kitchen cost to the nearest euro?

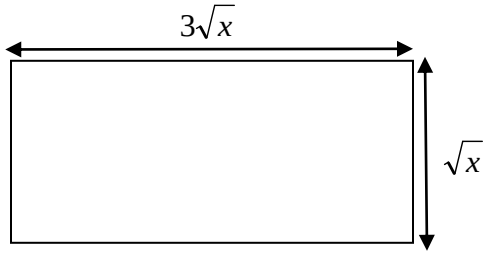
Q2. What fraction of the large circle is shaded?



The π Quiz 2018– Round 3

Irish Maths Teachers' Association, Cork Branch

Q1. The length of the diagonal in the rectangle shown below is $\sqrt{160}$ cm.



If a square has an area 12 times the area of this rectangle, find the length of the perimeter of the square.

Q2. Auntie Mary is three times as old as her niece today.
4 years ago, she was four times as old as her niece.
Find the sum of their current ages.

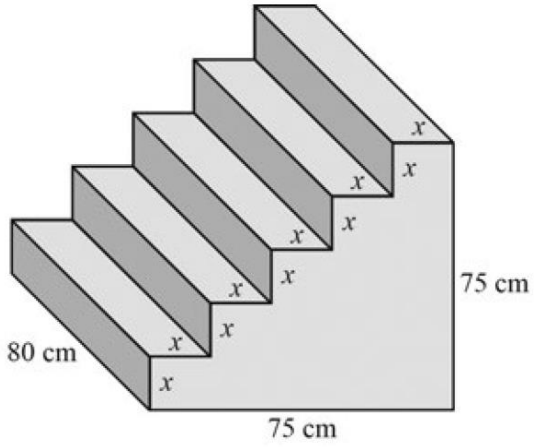
The π Quiz 2018 – Round 4

Irish Maths Teachers' Association, Cork Branch

Q1. John and Patricia share out €640 so that Patricia gets $\frac{3}{5}$ of what John gets.

How much does Patricia get?

Q2. The diagram below shows a set of concrete steps.



The height and width of each step is x cm as shown.
If the steps are 80 cm long and the total height of the 5 steps is 75 cm, find the total volume of the steps.

The π Quiz 2018 – Round 5

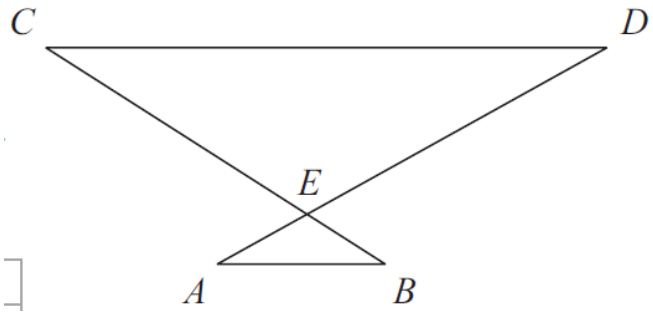
Irish Maths Teachers' Association, Cork Branch

Q1. Calculate the 23rd term of this sequence 3,11,19, 27, 35, ….

Q2. A cylindrical can has radius r and height h. If the lid is removed, the remaining surface area is A.
Express h in terms of A and r.

Q3. Find, correct to 2 significant figures, the values of x for which
$2(1-5x)^2+3(1-5x)-7=0$

Q4 In the diagram $[AB]$ is parallel to $[CD]$. $[AD]$ and $[CB]$ intersect at the point E.

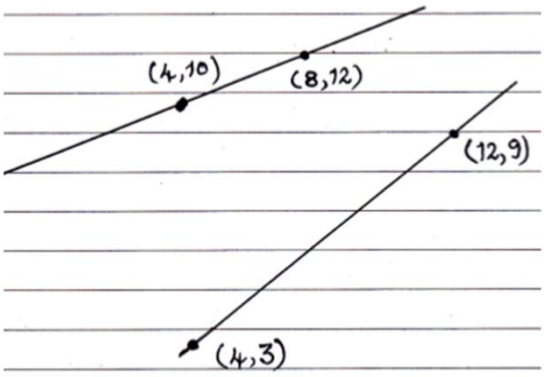


Given that $|\angle BEA|=119^\circ$, $|\angle DCE|=32^\circ$, $|AE|=16.5$, $|ED|=55$ and $|CD|=90$, find $|AB|$.

The π Quiz 2018 – Round 6

Irish Maths Teachers' Association, Cork Branch

Q1. Ann sketches these 2 lines.



Where would the lines meet if they were extended?

Q2. Jack and Jill want to go on a trip around the world and must save some money. They put €400 into their bank account on 1st of every month. They get compound interest of 3% per month on the first €1200 and 2% per month on the remainder. The interest is calculated on the last day of the month and rounded to the nearest cent. Their car breaks down and they must take out €500 on the last day of month 4. How much have they in their account on the last day of month 5?

Q3 P and Q are 2 sets such that $\#P = 10$, $\#Q = 11$ and $\#(P \cap Q) \geq 2$.
Find the difference between the maximum and minimum possible value of $\#(P \cup Q)$.

Q4 Ann leaves school for lunch at 13.00.
She walks home a distance of 1.7 km at an average speed of 5.1 km/h.
After having her lunch, she makes the return journey by the same path with an average speed of 4.25 km/h.
How long did she spend at home if she is back to school at 14.20?

The π Quiz 2018 – Round 7

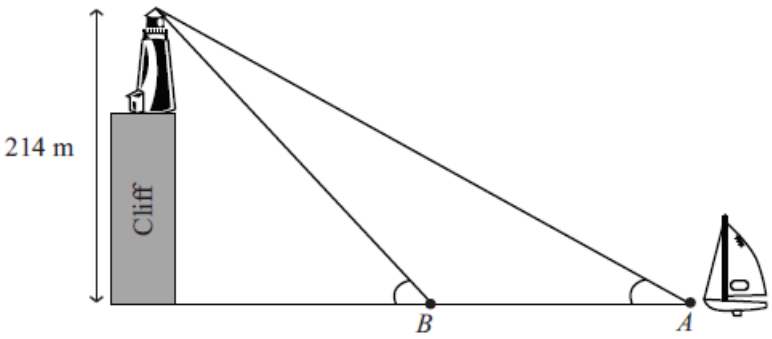
Irish Maths Teachers' Association, Cork Branch

Q1. A ball is dropped from a height, *h*, onto a smooth hard surface. Each time the ball strikes the ground it rebounds to $\frac{2}{3}$ of the height from which it fell. If the difference in rebound heights between the first and third bounce is 20 cm, calculate *h*.

Q2. 6 consecutive even integers have a sum of 546.
Find the difference between the mean and median of this array of numbers.

Q3. If (2, 4), (4, *x*) and (*x*, 8) are 3 collinear points, find the value of *x*, $x \in N$.

Q4.



A sailing boat is taking part in a race. During the race, the boat sails towards a lighthouse which stands on a vertical cliff face. The top of the lighthouse is 214 m above sea level.
Given that $|AB| = 250$ m and that at point *B*, the angle of elevation from the top of the lighthouse to the boat is 28°, calculate the angle of elevation at point A from the top of the lighthouse to the boat correct to 3 significant figures.

The π Quiz 2018– Round 8

Irish Maths Teachers' Association, Cork Branch

Q1. $h: x \to 2x - a$ and $k: x \to ax + b$
are 2 functions defined on R where a and $b \in Z$.
$h(3) = 1$ and $k(5) = 8$.
Hence, list the values of x for which $2h(x) \geq k(x), x \in N$.

Q2. *ABCD* is a rhombus where $A = (3, 0)$, $B = (-2, -1)$, $C = (-1, 4)$ and $D = (x, x+1)$.
Find the value of x.

Q3. A teacher has a box of 20 calculators, 12 are 'Casio' and 8 are 'Sharp'.
She is entering a team for the π Quiz and picks 4 calculators from the box for her team to practice with.
What is the probability that exactly one is a 'Casio'.
Give your answer in fraction form.

Q4. Solve for x:
$$\frac{2^5}{4^x} = \sqrt{32}$$

The π Quiz 2018 – Tie –break 1

Fill answers onto question page.

Irish Maths Teachers' Association, Cork Branch

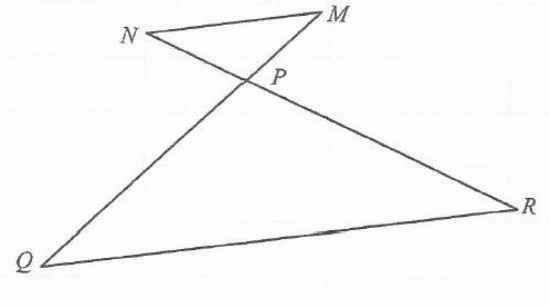
Q1. Julie and Tom share in a prize fund in the ratio $4\frac{1}{2} : 3\frac{3}{4}$.

If Julie's share is €36,000 then how much was the total prize fund?

_____

Q2. The area of a swimming pool is given by $2x^3 + 6x^2 - 25x - 25$ m^2.
Its width is $x + 5$ m.
Given that its length is 25 m, find the value of x. _____

Q3. In the diagram below, $|\angle MNP| = |\angle PRQ|$.



Given $|MN| = 6$, $|MP| = 3.6$, $|QP| = 9$ and $|PR| = 10$, find $|PN| + |QR|$.

_____

Q4. A quadratic equation has roots $-\frac{1}{2}$ and $\frac{3}{5}$.

Write the equation in the form $ax^2 + bx + c = 0$ where a, b and $c \in Z$.

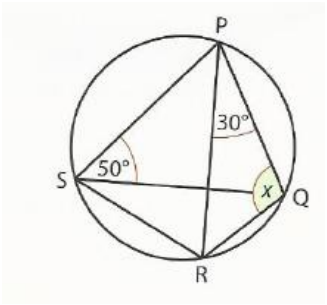
_____

The π Quiz 2018 – Tie –break 2

Fill answers onto question page.

Irish Maths Teachers' Association, Cork Branch

Q1. In the given diagram, $|\angle RPQ| = 30^\circ$ and $|\angle PSQ| = 50^\circ$, find the measure of the angle marked x.



_____

Q2. The sun produces 3.9×10^{33} ergs per second of radiant energy.
How much energy does it produce in 1 year?
Express your answer in the form $a \times 10^n$, where $a \in R$ and $1 \leq a < 10$.

_____

Q3. 12 men, working 8 hours a day for 10 days finish a job.
For how many hours a day must 16 men work to finish the job in 6 days?

_____

Q4. Water flows through a circular pipe of internal diameter 8 cm at a speed of 15 cm/s. Calculate in terms of π, the rate of flow of water from the pipe. The water flows into a cylindrical container of base diameter 24 cm and height 60 cm. How long will it take to fill the container? _____

Answers

	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8
Q1	$\frac{1}{\sqrt{13}}$ or $\frac{\sqrt{13}}{13}$	€11,768	96 cm	€240	179	(32, 24)	54 cm	1,2,3,4,5,6,7
Q2	$\frac{2x}{2x-3}$	$\frac{1}{2}$	48	270,000 cm^3	$h=\frac{A-\pi r^2}{2\pi r}$	€1662.92	0	4
Q3					0.75 and -0.05	8	6	$\frac{224}{1615}$
Q4					27	36 minutes	18.2°	$\frac{5}{4}$

Tiebreak 1

Q1 €66,000

Q2 5

Q3 19

Q4 $10x^2-x-3=0$

Tiebreak 2

Q1 100°

Q2 1.229904×10^{41}

Q3 10

Q4 36 s