



PRACTICE ROUND

SHORT QUESTIONS

10 minutes

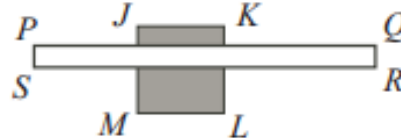
Write your answer in the boxes on the right of each question.

Submit ONE question sheet per team.

TEAM #	
Score	

Question 1:

$JKLM$ is a square and $PQRS$ is a rectangle. If JK is parallel to PQ , $JK=8$ and $PS=2$, then what is the total area of the shaded region?



Question 2:

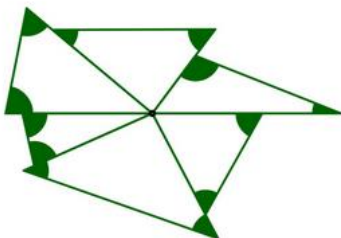
Find the radius of a circle if its area is half of its circumference.

Question 3:

On every birthday since I was born, I have had a cake decorated with the same number of candles as my age. I have blown out 171 candles so far. How old am I?

Question 4:

What is the sum of all of the angles that are shaded?





ROUND 1
SHORT QUESTIONS
10 minutes

Write your answer in the boxes
on the right of each question.

Submit ONE question sheet per
team.

TEAM #	
Score	

Question 1:

What is the value of T if the following are true:

$$I + S + M + T + F = 162$$

$$I + T = 92$$

$$S + M = 82$$

$$FS = 60$$

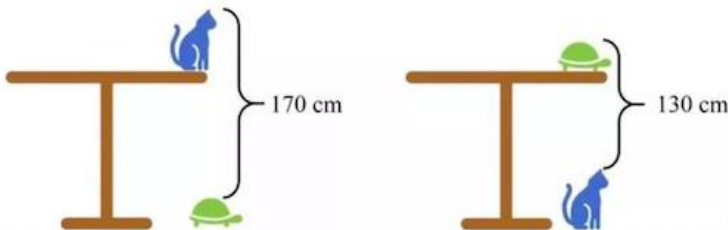
$$M - T = 26$$

Question 2:

Jerry has a cylindrical tin can with a 12 cm diameter lid. The longest possible pencil he can fit in the can and still close the lid is 13 cm long. What is the volume of the can in terms of π ?

Question 3:

What is the height of the table?



Question 4:

Cindy took a special test where you earn 1 point for each correct answer and lose $\frac{1}{4}$ of a point for each incorrect answer. The test contained 25 questions, she answered **all** questions and her final score was 13.75. What percentage of the questions did she get right?



ROUND 2
SHORT QUESTIONS
10 minutes

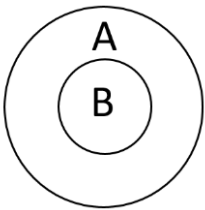
Write your answer in the boxes
on the right of each question.

Submit ONE question sheet per
team.

TEAM #	
Score	

Question 1:

David and Eric each shot 6 arrows at the target shown. David shot 4 arrows into A and 2 into B; his score was 18 points. Eric shot 3 into A and 3 into B; his score was 21 points. How many points were given for an arrow in B?



Question 2:

If $1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{x}}} = \frac{8}{5}$ then find the value of x.

Question 3:

In a jar of red, green, and blue marbles, all but 6 are red marbles, all but 8 are green, and all but 4 are blue. How many marbles are in the jar?

Question 4:

ABA and BAB represent two 3-digit whole numbers in which A and B are distinct, non-zero digits. Find the mean of the smallest and the greatest possible sums of ABA and BAB.



ROUND 3
MULTIPLE CHOICE
15 minutes

Put a ring around the correct answer.

Submit ONE answer sheet per team.

TEAM #	
Score	

Question 1:

Sam picks four consecutive positive integers. He divides each integer by four, and then adds the remainders together. The sum of the remainders is

Answer A 6	Answer B 1	Answer C 2	Answer D 3	Answer E 4
---------------	---------------	---------------	---------------	---------------

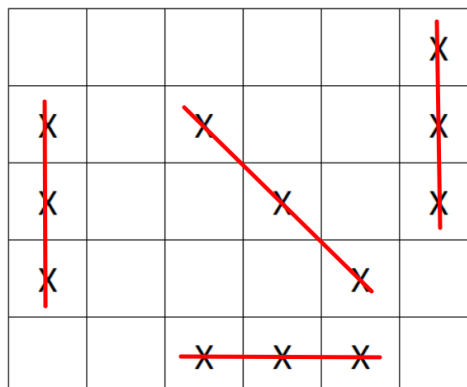
Question 2:

x and y are odd numbers. Which of the following expressions is **always** even?

Answer A $3x+2y$	Answer B $x^2 + 2x$	Answer C $x^3 - 2x$	Answer D $x^3 + x$	Answer E $2x^3 + 3$
---------------------	------------------------	------------------------	-----------------------	------------------------

Question 3:

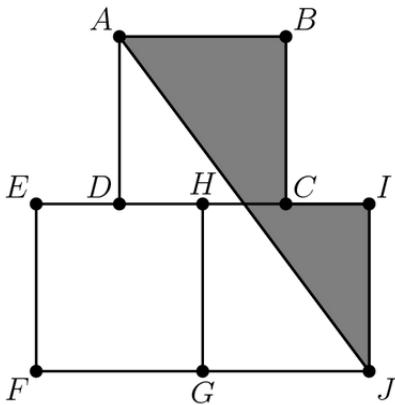
Students are playing a new version of noughts and crosses (tic-tac-toe) on larger rectangular grids like the one in the diagram below. You still only need 3 in a row to win. How many different ways are there to get three in a row on this grid? Four of the possibilities are shown here.



Answer A 33	Answer B 62	Answer C 50	Answer D 60	Answer E 42
----------------	----------------	----------------	----------------	----------------

Question 4:

Squares $ABCD$, $EFGH$, and $GHIJ$ are equal in area. Points C and D are the midpoints of sides IH and HE , respectively. What is the ratio of the area of the shaded pentagon $AJICB$ to the sum of the areas of the three squares?



Answer A $\frac{1}{4}$	Answer B $\frac{7}{24}$	Answer C $\frac{1}{3}$	Answer D $\frac{3}{8}$	Answer E $\frac{5}{12}$
---------------------------	----------------------------	---------------------------	---------------------------	----------------------------

Question 5:

The angles of an irregular pentagon are in the ratio **3 : 5 : 7 : 8 : 13**. What is the difference between the largest angle and the smallest angle?

Answer A 160	Answer B 100	Answer C 150	Answer D 40	Answer E 195
-----------------	-----------------	-----------------	----------------	-----------------

Question 6:

If 18% of 42 is equal to 27% of x , then what is the value of x ?

Answer A 28	Answer B 63	Answer C 30	Answer D 343	Answer E 12
----------------	----------------	----------------	-----------------	----------------

Question 7:

A palindromic number is one which reads the same when its digits are reversed, for example 23832. What is the largest six-digit palindromic number which is exactly divisible by 15?

Answer A 159951	Answer B 546645	Answer C 999995	Answer D 598895	Answer E 597795
--------------------	--------------------	--------------------	--------------------	--------------------

Question 8:

What is the value of $\sqrt{1 + 3 + 5 + 7 + \dots + 25 + 27 + 29}$?

Answer A 20	Answer B 16	Answer C 10	Answer D 14	Answer E 15
----------------	----------------	----------------	----------------	----------------

Question 9:

There are six different three-digit numbers, each of which contains all the digits 1, 3 and 7. How many of these three-digit numbers are prime?

Answer A 0	Answer B 1	Answer C 2	Answer D 3	Answer E 4
---------------	---------------	---------------	---------------	---------------

Question 10:

The pattern 123451234512345... is continued to form a 2000-digit number. What is the sum of all the digits?

Answer A 6000	Answer B 7500	Answer C 30000	Answer D 60000	Answer E 8900
------------------	------------------	-------------------	-------------------	------------------

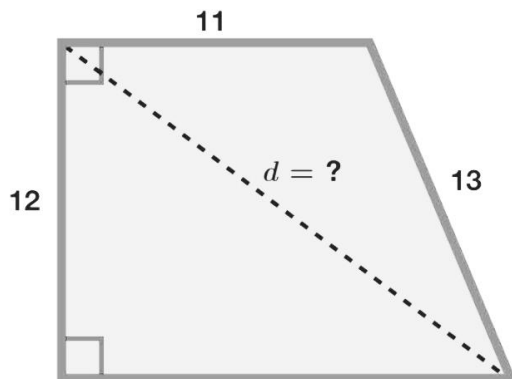
Question 11:

The results obtained by subtracting the square of a number from the number is greatest when the number is

Answer A 5	Answer B 1	Answer C $\frac{1}{2}$	Answer D $\frac{1}{10}$	Answer E -5
---------------	---------------	---------------------------	----------------------------	----------------

Question 12:

Find the distance d :



Answer A 17	Answer B 18	Answer C 19	Answer D 20	Answer E None of these
----------------	----------------	----------------	----------------	---------------------------

Question 13:

A rectangular page of a book is 6 cm longer than it is wide. If the book designer would increase the length by 3 cm and the width by 2 cm, then the area of the page would increase by 68cm^2 . What is the current area of the page?

Answer A 10cm^2	Answer B 68cm^2	Answer C 100cm^2	Answer D 160cm^2	Answer E 408cm^2
-----------------------------	-----------------------------	------------------------------	------------------------------	------------------------------

Question 14:

In a competition, there are 20 questions. You get 2 marks for a correct answer, -1 marks for a wrong answer and no marks for leaving a question out. Tony gets 12 marks and he left out five questions. How many mistakes did he make?

Answer A 6	Answer B 3	Answer C 2	Answer D 5	Answer E 8
---------------	---------------	---------------	---------------	---------------

Question 15:

A rectangular grazing area is to be fenced off on three sides using part of a 100 meter rock wall as the fourth side. Fence posts are to be placed every 12 meters along the fence including the two places where the fence meets the rock wall. What is the fewest number of posts required to fence an area 36m by 60m ?

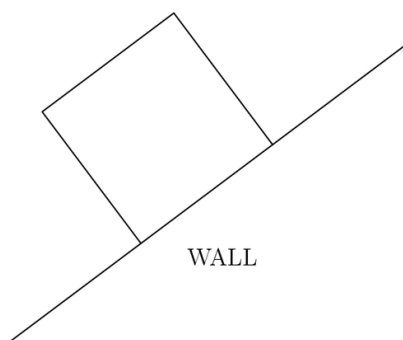


Diagram not to scale

Answer A 11	Answer B 12	Answer C 13	Answer D 14	Answer E 16
----------------	----------------	----------------	----------------	----------------



ROUND 4
LONG QUESTIONS
15 minutes

Write your answer in the boxes
on the right of each question.

Submit ONE question sheet per
team.

TEAM #	
Score	

Question 1:

Six cards numbered **1 to 6** are placed in a line so that for each pair of neighbouring cards, one is a multiple of the other. In how many ways can this be done?

Question 2:

A dog is tied to the corner of a dog house that is **2m x 4m**. His leash is **5m** long.

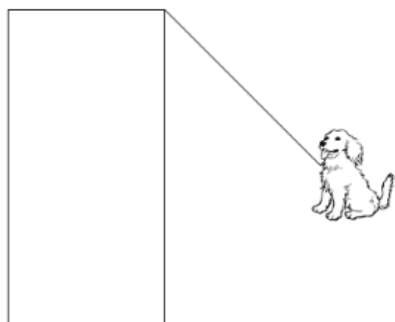


Diagram not to scale

Determine the largest area the dog may roam, in square metres, **outside** the dog house. Express your answer as a **fraction of π** .

Question 3:

An arithmetic sequence is a sequence in which each term after the first is obtained by adding a constant to the previous term. For example, 2, 4, 6, 8 and 1, 4, 7, 10 are arithmetic sequences. In the grid shown, the numbers in each row must form an arithmetic sequence and the numbers in each column must form an arithmetic sequence. The value for **x** is?

5			
			1211
		1013	
23	x		



ROUND 5
LONG QUESTIONS
15 minutes

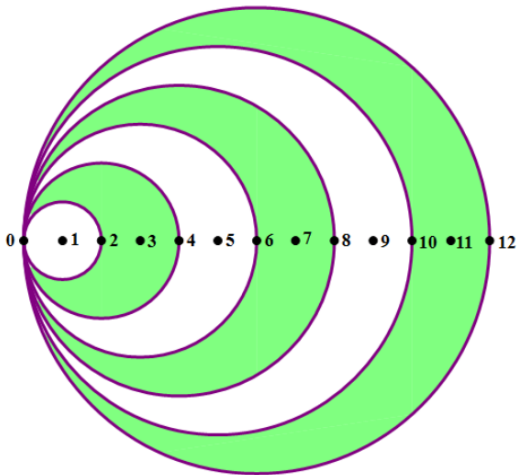
Write your answer in the boxes
on the right of each question.

Submit ONE question sheet per
team.

TEAM #	
Score	

Question 1:

In the diagram above, all the points are on a line, and the number of each point indicates how many units that point is from zero. The points #1 – #6 are the centers of the six circles, and all circles pass through point zero. What is the total area of the shaded region **in terms of π** ?



Question 2:

If x and y are values such that $2^{2x-3}8^3 = 4^{x+5}4^y$

Determine the value of 16^y .

Question 3:

When the list of numbers **a, b, 40, 82, 55, 36** are written in numerical order we can determine that the mean of the list is 65 and the median is exactly equal to the mode of the list. Determine the product **ab**.



ROUND 6
SHORT QUESTIONS
10 minutes

Write your answer in the boxes
on the right of each question.

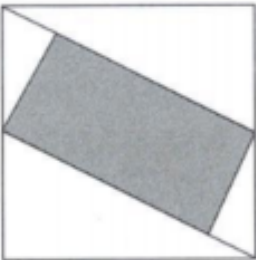
Submit ONE question sheet per
team.

TEAM #	
Score	

Question 1:

Given that $A * B = AB - \frac{A}{B}$ What is the value of $(24 * 2) * (4 * 2)$?	
---	--

Question 2:

The diagram shows a square with two lines from a corner to the middle of an opposite side. The rectangle fits exactly inside these two lines and the square itself. What fraction of the square is occupied by the shaded rectangle? 	
---	--

Question 3:

How many times does the digit '1' appear in the page numbers of a book that has 200 pages?	
--	--

Question 4:

10 evenly-spaced points ($A_1, A_2, \dots, A_{10}$) are marked on the circumference of a circle, and the centre is marked C. What is the measure of the angle $\angle A_1 A_5 C$?	
--	--



ROUND 7
MULTIPLE CHOICE
 15 minutes

Put a ring around the correct answer.

Submit ONE answer sheet per team.

TEAM #	
Score	

Question 1:

To pin up a rectangular picture Sam needs 4 pins, one at each corner. For two pictures he needs only 6 pins since he can overlap pictures. What is the **smallest** number of pins he needs to pin up 10 pictures?



Answer A 24	Answer B 20	Answer C 16	Answer D 22	Answer E 18
----------------	----------------	----------------	----------------	----------------

Question 2:

What is the product of

$$\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \dots \times \frac{2020}{2019} \quad ?$$

Answer A 1010	Answer B 2020	Answer C 30300	Answer D 40400	Answer E <i>Not possible</i>
------------------	------------------	-------------------	-------------------	---------------------------------

Question 3:

Three green parrots eat 36 grams of seeds in 4 days, while five pink parrots eat 60 grams of seeds in three days. How many days can we feed 2 green and 4 pink parrots if we have 88 grams of seeds?

Answer A 8	Answer B 4	Answer C 3	Answer D 5	Answer E 7
---------------	---------------	---------------	---------------	---------------

Question 4:

Which of the following numbers is the largest?				
Answer A $((2^3)^2)^3$	Answer B $(2^3)^{(2^3)}$	Answer C $2^{((3^2)^3)}$	Answer D $2^{(3^{(2^3)})}$	Answer E $2^3 \cdot 2^3 \cdot 2^3$

Question 5:

On the dot grid below, how many different sizes of equilateral triangles can be drawn? 				
Answer A 15	Answer B 2	Answer C 4	Answer D 5	Answer E 10

Question 6:

The drama club is preparing for their annual drama show. They start to practise on a Monday. The show is on the 53rd day of practice. On which day of the week will the show be?				
Answer A Monday	Answer B Wednesday	Answer C Thursday	Answer D Saturday	Answer E Tuesday

Question 7:

If $x^2yz^3 = 7^3$ and $xy^2 = 7^9$ then xyz equals				
Answer A 7^{10}	Answer B 7^9	Answer C 7^8	Answer D 7^6	Answer E 7^4

Question 8:

How many seconds will elapse between 21:18 January 31 st 2019 and 22:08 February 1 st 2019?				
Answer A 3000	Answer B 46200	Answer C 75000	Answer D 89400	Answer E 147000

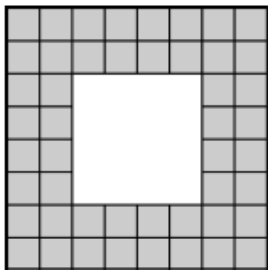
Question 9:

The Fort Worth Zoo has a number of two-legged birds and a number of four-legged mammals. On one visit to the zoo, Margie counted 200 heads and 522 legs. How many of the animals that Margie counted were two-legged birds?

Answer A 61	Answer B 122	Answer C 139	Answer D 150	Answer E 161
----------------	-----------------	-----------------	-----------------	-----------------

Question 10:

There are 48 paper squares in a frame 8 by 8 squares with a width of 2 squares (see picture below).



How many paper squares are in the frame 254 by 254 squares with the width of 2 squares?

Answer A 2016	Answer B 2017	Answer C 2018	Answer D 2019	Answer E 2020
------------------	------------------	------------------	------------------	------------------

Question 11:

A teacher has a list of marks: 17, 13, 5, 10, 14, 9, 12, 16.
Which two marks can be removed without changing the average?

Answer A 10 and 12	Answer B 10 and 14	Answer C 9 and 16	Answer D 12 and 17	Answer E 5 and 17
-----------------------	-----------------------	----------------------	-----------------------	----------------------

Question 12:

The speeds of three cars are in the ratio of **2:3:4**. What will be the ratio of the times taken by them to travel the same distance?

Answer A 4:3:2	Answer B 5:4:3	Answer C 6:4:3	Answer D 6:5:4	Answer E 1:1:1
-------------------	-------------------	-------------------	-------------------	-------------------

Question 13:

What is the sum of the digits in the obtained product $2^{20} \times 5^{17}$?

Answer A 167	Answer B 28	Answer C 18	Answer D 8	Answer E 12
-----------------	----------------	----------------	---------------	----------------

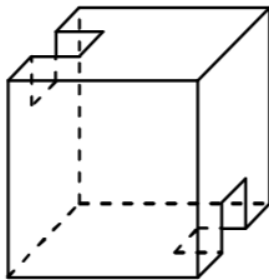
Question 14:

The volume of cuboid is 64 cm^3 . The length of the prism is halved, the width is tripled, and the height is divided by four. The volume of the new prism is:

Answer A 96 cm^3	Answer B 48 cm^3	Answer C 32 cm^3	Answer D 16 cm^3	Answer E 24 cm^3
-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------

Question 15:

A cube with two holes is pictured below.



The correct net for this cube is:

Answer A A)	Answer B B)	Answer C C)	Answer D D) D)	Answer E E) E)
--------------------	--------------------	--------------------	--------------------------	--------------------------



ROUND 8
SHORT QUESTIONS
10 minutes

Write your answer in the boxes
on the right of each question.

Submit ONE question sheet per
team.

TEAM #	
Score	

Question 1:

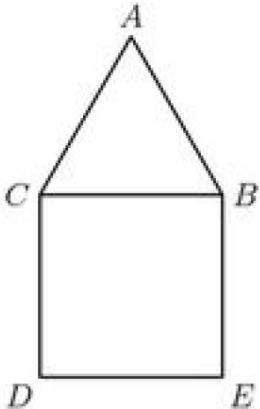
A **1x1x1** cube is glued to the top face of a **2x2x2** cube, which in turn is glued to the top face of a **3x3x3** cube. What is the total surface area of this stack of cubes, including the bottom face?

Question 2:

In a **3 x 3** magic square all columns, all rows and both diagonals have the same total.
If the sum of one row is **126** and the 9 numbers are consecutive even numbers, what is the sum of the highest and the lowest number in the square?

Question 3:

An equilateral triangle ABC shares a common side BC with a square BCDE, as pictured. What is the size of angle DAE?



Question 4:

I am a four-digit number with all four digits different.
The thousands digit is three times as big as the tens digit.
I am divisible by 5 but not by 10.
Two of my digits are prime numbers; one digit is a composite number.
I am divisible by 3 and 9
The largest digit is in the largest place value position.
What number am I?



ROUND 9
LONG QUESTIONS
15 minutes

Write your answer in the boxes
on the right of each question.

Submit ONE question sheet per
team.

TEAM #	
Score	

Question 1:

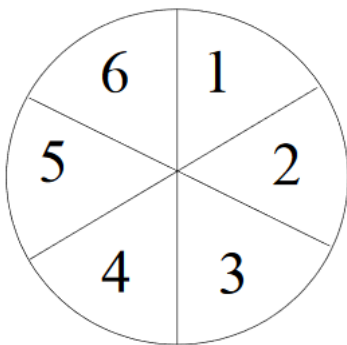
The number 102564 has the property that if the last digit is moved to the front, the resulting number, namely 410256, is 4 times bigger than the original number:

$$410256 = 4 \times 102564$$

Find a six-digit number whose last digit is 9 and which becomes 4 times bigger when we move this 9 to the front.

Question 2:

A pizza is cut into six slices. Tom can choose any piece to eat first, but after that, each piece he chooses must have been next to a piece that has already been eaten (to make it easy to get the piece out of the pan). In how many different orders could he eat the six pieces?



Question 3:

It takes the older brother 10 minutes and the younger brother 12 minutes to go from home to school. If the younger brother leaves home 1 minute earlier, how long will it take the older brother to catch him up?



ROUND 10
LONG QUESTIONS
15 minutes

Write your answer in the boxes
on the right of each question.

Submit ONE question sheet per
team.

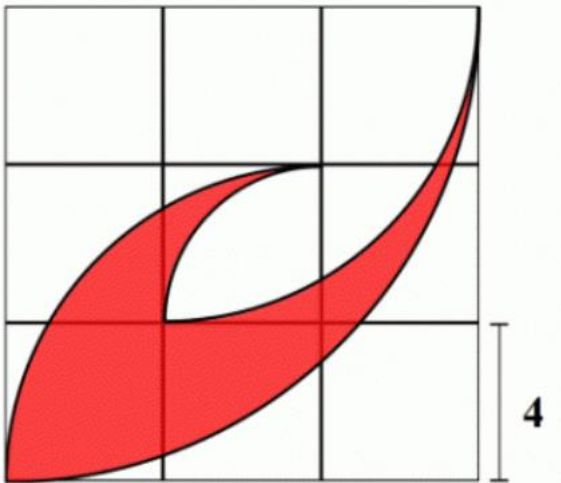
TEAM #	
Score	

Question 1:

On a Cartesian grid, the **x-axis**, the line **$y = 12$** and the line **$y = 2x + 10$** are drawn. What is the equation of the line that must be drawn through the point **$(2, 12)$** to enclose a trapezium with an area of 66 squares between the four lines.

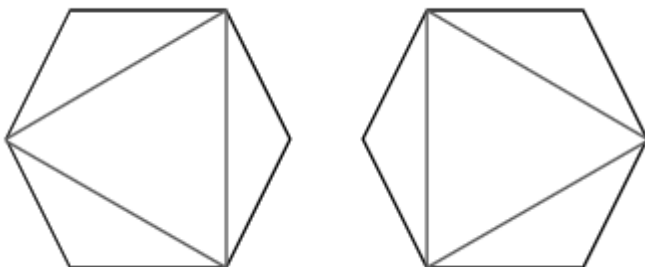
Question 2:

Find the area of the shaded section in the diagram below, giving your **answer in terms of π** . (The figure has squares and quarter circles)



Question 3:

How many triangles can be formed by the vertices of a **heptagon** that do not possess sides that are also sides of the heptagon? For example, in a hexagon, you can draw two such triangles, as shown in the diagram.





TIE BREAK 1 **SHORT QUESTIONS** 10 minutes

Write your answer in the boxes
on the right of each question.

Submit ONE question sheet per
team.

TEAM #	
Score	

Question 1:

Work out the value of $(a^b)^c$ if a= 1st prime number, b= 2nd square number and c= 3rd triangular number.	
--	--

Question 2:

You have three inscribed squares, with the corners of each inner square at the $\frac{1}{4}$ point along the sides of its outer square. (So, for example, $AB = \frac{1}{4}AC$, and $BD = \frac{1}{4}BE$). The area of the largest square is 64m². What is the area of the smallest square?	
--	--

Question 3:

A train 1000 metres long travels through a 3000 metre tunnel. If 30 seconds pass from the time the last car has just completely entered the tunnel until the time when the front of the engine emerges from the other end, what is the speed of the train in kilometres per hour?	
---	--

Question 4:

3 boys and 3 girls are to sit in a row. How many ways can this be done if all the boys sit together?	
---	--



TIE BREAK 2
SHORT QUESTIONS
10 minutes

Write your answer in the boxes
on the right of each question.

Submit ONE question sheet per
team.

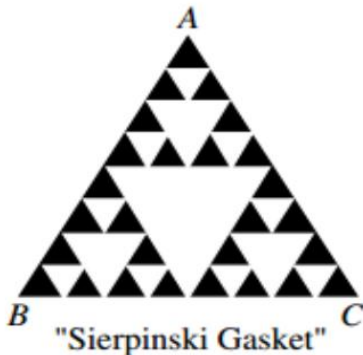
TEAM #	
Score	

Question 1:

If you add the square of Tom's age to the age of Mary, the sum is 62; but if you add the square of Mary's age to the age of Tom, the result is 176. What is the sum of their ages?

Question 2:

In the diagram below, all triangles are equilateral. If $AB=16$, then the **exact** total area of all the black triangles added together is:



Question 3:

Frank has 27 songs on his phone. They are either rock songs or hip hop songs. Fourteen of the songs are from the 1990s. Eleven of the songs are rock songs. Five of the songs are hip hop songs from the 2000s. How many of the songs are rock songs from the 1990s?

Question 4:

What is the units digit of 3 to the 2019th power?

ANSWERS – ALL ROUNDS

PRACTICE ROUND – SHORT QUESTIONS

- 1) 48
- 2) 1 or $r=1$
- 3) 18
- 4) 720°

ROUND 1 – SHORT QUESTIONS

- 1) 61
- 2) 180π
- 3) 150 (*cm*)
- 4) 64%

ROUND 2 – SHORT QUESTIONS

- 1) 5 (*points*)
- 2) 2 or $x=2$
- 3) 9 (*marbles*)
- 4) 1110

ROUND 3 – MULTIPLE CHOICE

Question n ^o	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	A	D	B	C	C	A	E	E	D	A	C	D	D	A	B

ROUND 4 – LONG QUESTIONS

- 1) 4
- 2) $\frac{85\pi}{4}$ or $21\frac{1}{4}\pi$ (*accept 21.25 π*)
- 3) 619 or $x=619$

ROUND 5 – LONG QUESTIONS

- 1) 21π
- 2) $\frac{1}{256}$
- 3) 6710

ROUND 6 – SHORT QUESTIONS

- 1) 210
- 2) $\frac{2}{5}$ or any equivalent fraction (accept also 0.4 or 40%)
- 3) 140
- 4) 18°

ROUND 7 – MULTIPLE CHOICE

Question n ^o	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	E	A	B	D	B	C	E	D	C	A	B	C	D	E	D

ROUND 8 – SHORT QUESTIONS

- 1) 74
- 2) 84
- 3) 30°
- 4) 9135

ROUND 9 – LONG QUESTIONS

- 1) 230769
- 2) 96
- 3) 5 (*minutes*)

ROUND 10 – LONG QUESTIONS

- 1) $y = -4x + 20$
- 2) $32\pi - 64$
- 3) 7

TIE BREAK 1 – SHORT QUESTIONS

- 1) 16,777,216
- 2) 25 (m^2)
- 3) 240 (km/h)
- 4) 144

TIE BREAK 2 – SHORT QUESTIONS

- 1) 20
- 2) $27\sqrt{3}$
- 3) 3
- 4) 7