ISMTF Middle School Competition – Toulouse June 2021

ROUND 1

The following are the 20 multiple choice questions for round 1 of the competition with the correct answers.

- Each question has options A,B,C,D and E
- Option E is always ‘No Answer’ and should be awarded ‘1’ point
- The correct answer should be awarded ‘4’ points
- An incorrect answer should be awarded ‘0’ points

Question 1

A map is drawn to a scale of 1:10 000.

On the map, the Gauss Forest occupies a rectangular region measuring 10 cm by 100 cm.

What is the actual area of the Gauss Forest, in km^2?

Correct answer

A	B	C	D	E
0.1	10	1	10000	NO ANSWER

Question 2

A bag contains 20 purple and 40 green marbles. How many purple marbles need to be added so that $\frac{5}{12}$ of the marbles will be green?

A	B	C	D	E
16	36	46	26	NO ANSWER

Question 3

A snail is climbing vertically up a garden wall. The top of the wall is 7m from the snail's starting position. The snail climbs 2m up in the first half of each hour. In the second half of each hour, the snail rests but slides down 1m.

How long does it take the snail to reach the top of the garden wall?

A	B	C	D	E
7 hours	6.5 hours	6 hours	5.5 hours	NO ANSWER

Question 4

The arithmetic average of five positive integers is 30. What is the greatest possible value of their median?

A	B	C	D	E
48	49	48.5	50	NO ANSWER

Question 5

Some swimmers who race in the backstroke have developed the bad habit of doing other things backward too! Every statement they make about the results of the backstroke event is false. Given the 4 statements below, determine which swimmers placed SECOND

ART: Clint was 4th
BEV: Clint beat Dianne.
CLINT: Art beat Bev
DIANNE: I was 1st.

A	B	C	D	E
Art	Bev	Clint	Dianne	NO ANSWER

Question 6

The lengths of two sides of a triangle are 2 and 10. All lengths are different, all lengths are integers, and 10 is the longest side. What is the perimeter of the triangle?

A	B	C	D	E
22	23	19	21	NO ANSWER

Question 7

The sum of the interior angles of a regular polygon is triple the sum of its exterior angles. How many sides does the polygon have?

A	B	C	D	E
6	7	8	10	NO ANSWER

Question 8

The circles in the archery target shown below have radii of r, r+1, r+2, r+3 and r+4, respectively, where r is a positive integer. What percentage of the target is shaded?

A	B	C	D	E
40	60	40π	64	NO ANSWER

Question 9

State the value of $1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+1}}}}$

A	B	C	D	E
$\frac{5}{8}$	$\frac{13}{8}$	$\frac{29}{30}$	$\frac{8}{5}$	NO ANSWER

Question 10

Alice filled up the gas tank of her car before going on a long drive. The equation below models the amount of gas, *g,* in gallons in Alice's car when she has driven *m* miles. What is the meaning of 32 in the equation?

$$g = 15 - \frac{m}{32}$$

A	B	C	D	E
Alice uses 32 gallons per mile	Alice's tank can hold 32 gallons	Alice can drive 32 miles on 1 tank	Alice's car can travel 32 miles to the gallon	NO ANSWER

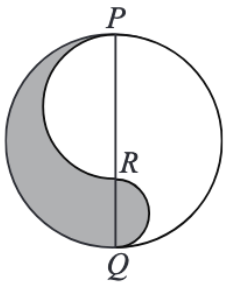
Question 11

If the radius of a circle is increased by 30%, what is the approximate increase in its area?

A	B	C	D	E
27%	30%	69%	94%	NO ANSWER

Question 12

In the diagram, PQ is a diameter of a larger circle, point R is on PQ, and smaller semi-circles with diameters PR and QR are drawn. If PR = 6 and QR = 4, what is the ratio of the area of the shaded region to the area of the unshaded region?



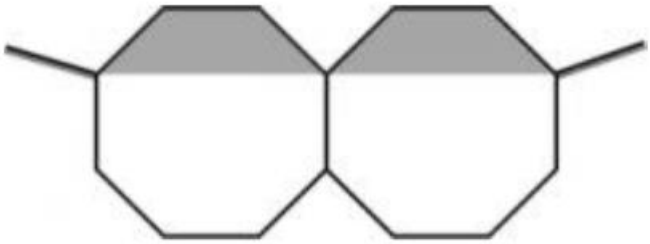
A	B	C	D	E
4 : 9	2 : 3	3 : 5	2 : 5	NO ANSWER

Question 13

Daniel's age is one-ninth of his father's age. One year from now, Daniel's father's age will be seven times Daniel's age. The difference between their current ages is

A	B	C	D	E
24	25	26	27	NO ANSWER

Question 14

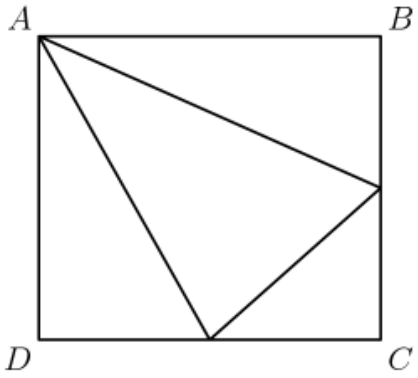


The two regular octagons (shown in the diagram) represent the lenses of a pair of glasses.
The tinted area of the lenses is shown in grey.
The total area of both lenses is 24 cm^2.

What is the total area of the tinted parts in cm^2 ?

A	B	C	D	E
6	2	4	3	NO ANSWER

Question 15



The area of rectangle *ABCD* is 72 units squared. If point *A* and the midpoints of BC and CD are joined to form a triangle, the area of that triangle is…

A	B	C	D	E
36	30	27	21	NO ANSWER

Question 16

A rhombus has integer diagonal lengths, and integer side lengths. It's area is 120. What is the perimeter of the rhombus?

A	B	C	D	E
40	20	52	60	NO ANSWER

Question 17

A triangle can be formed having side lengths of 4, 5 and 8. It is impossible, however, to construct a triangle with side lengths of 4, 5 and 9. Marie has eight sticks, each having an integer length. She observes that she cannot form a triangle using any three of these sticks as side lengths. The shortest possible length of the longest of the eight sticks is

A	B	C	D	E
20	21	22	23	NO ANSWER

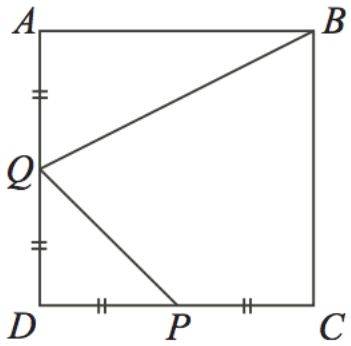
Question 18

Five points are located on a line. When the ten distances between pairs of points are listed from smallest to largest, the list reads: $2, 4, 5, 7, 8, k, 13, 15, 17, 19$. What is the value of k?

A	B	C	D	E
9	10	11	12	NO ANSWER

Question 19

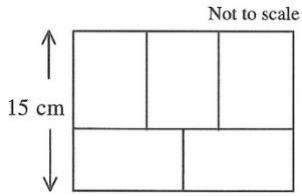
In square ABCD, P is the midpoint of DC and Q is the midpoint of AD. If the area of the quadrilateral QBCP is 15, what is the area of square ABCD?



A	B	C	D	E
27.5	24	25	30	NO ANSWER

Question 20

Five identical rectangles fit together as shown. What, in cm^2, is the total area which they cover?



A	B	C	D	E
270	300	330	360	NO ANSWER