Question 1:

Evaluate $\left[\left(\frac{2017+2017}{2017}\right)^{-1}-\left(\frac{2018}{2018+2018}\right)^{-1}\right]^{-1}$

Question 2:

Jane is told to create an expression from $2[\ ]0[\ ]1[\ ]7$ by putting a $+$ in one box, a $-$ in another, and a $\times$ in the remaining box. She calculates the value of each expression and obtains a maximum value of M and a minimum value of m.

What is $M - m$?

Question 3:

The ratio of the width to the height of a rectangular screen is 3 : 2. If the length of a diagonal of the screen is 65 cm, what is the area of the screen, in cm²?

Question 4:

What is the smallest two-digit positive integer k for which the product $45k$ is a perfect square?

Question 5:

Joti has a cylinder with radius 10 cm and height 75 cm that is closed at the bottom. Joti puts some solid spheres of radius 10 cm inside the cylinder and then closes the top end of the cylinder. If she puts the largest possible number of spheres in the cylinder, what is the volume, in cm³, of the cylinder that is not taken up by the spheres?

Question 6:

If n is the largest positive integer with $n^2 < 2017$ and m is the smallest positive integer with $2017 < m^2$, what is the value of $m^2 - n^2$?

Question 7:

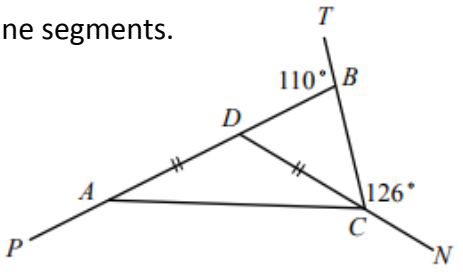
A street magician has three cups labelled, in order, A, B, C that he has upside down on his table. He has a sequence of moves that he uses to scramble the three cups: he swaps the first and second, then he swaps the second and third, then he swaps the first and third.
If he goes through this sequence of three moves a total of nine times, in what order will the cups be?

Question 8:

A two-digit integer between 10 and 99, inclusive, is chosen at random. Each possible integer is equally likely to be chosen. What is the probability that its tens digit is a multiple of its units (ones) digit?

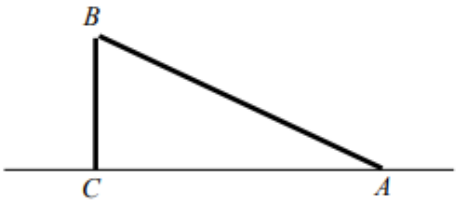
Question 9:

In the diagram, $PADB$, TBC and NCD are straight line segments.
If $\angle TBD = 110^o$, $\angle BCN = 126^o$, and $DC = DA$,
what is the size of angle $\angle PAC$?



Question 10:

A telephone pole that is 14 m tall was struck by lightning and broken into two pieces. The top piece, AB, has fallen down. The top of the pole is resting on the ground, but it is still connected to the main pole at B. The pole is still perpendicular to the ground at C. If the angle between AB and the flat ground is 30°, how high above the ground is the break?



Question 11:

Determine all real values of x for which $16^x - \frac{5}{2} \times 2^{2x+1} + 4 = 0$

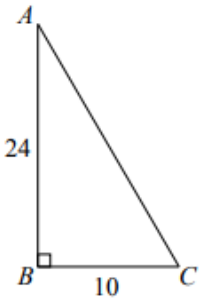
Question 12:

Determine the value of the expression

$1 + 2 - 3 + 4 + 5 - 6 + 7 + 8 - 9 + 10 + 11 - 12 + \cdots + 94 + 95 - 96 + 97 + 98 - 99.$

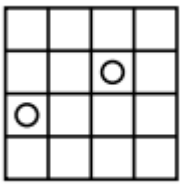
Question 1:

In the diagram, ΔABC is right-angled at B with AB = 24 and BC = 10.
If AB and BC are each increased by 6, by how much does AC increase?



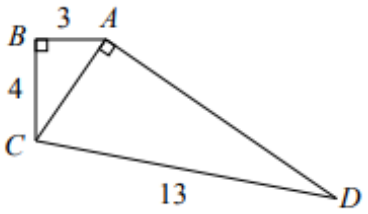
Question 2:

In the diagram below, how many rectangles contain both circles?



Question 3:

In the diagram, ΔABC is right-angled at B and ΔACD is right-angled at A. Also, AB = 3, BC = 4, and CD = 13. What is the area of quadrilateral $ABCD$?

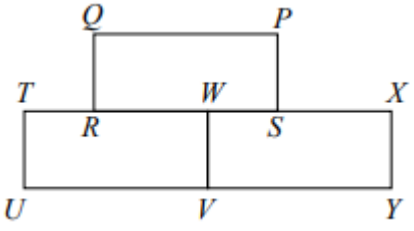


Question 4:

One of the faces of a rectangular prism has area 27 cm² . Another face has area 32 cm². If the volume of the prism is 144 cm³ , what is the surface area of the prism in cm² ?

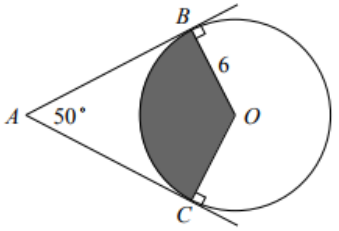
Question 5:

Three identical rectangles $PQRS$, $WTUV$ and $XWVY$ are arranged, as shown, so that RS lies along TX. The perimeter of each of the three rectangles is 24 cm. What is the perimeter of the whole shape?



Question 6:

In the diagram, the circle has centre O and radius 6. Point A is outside the circle and points B and C are on the circle so that AB is perpendicular to BO, AC is perpendicular to CO, and $\angle BAC$ = 50°. What is the area of the shaded region?

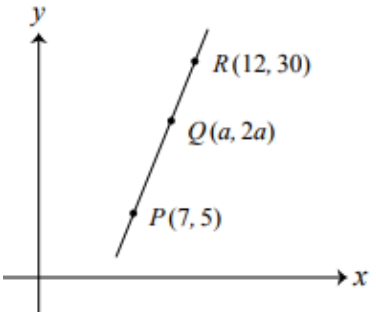


Question 7:

The sum of the radii of two circles is 12 cm. The circumference of the larger circle is 3 cm greater than the circumference of the smaller circle. What is the difference between the area of the larger circle and the area of the smaller circle?

Question 8:

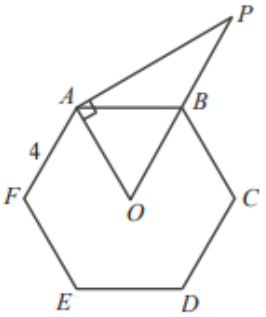
In the diagram, points $P(7, 5)$, $Q(a, 2a)$, and $R(12, 30)$ lie on a straight line. What is the value of a?



Question 9:

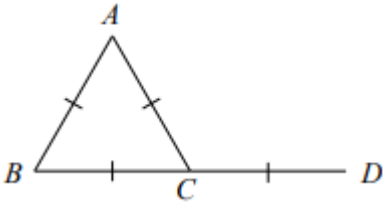
In the diagram, $ABCDEF$ is a regular hexagon with side length 4 and centre O. The line segment perpendicular to OA and passing through A meets OB extended at P.

What is the area of ΔOAP ?



Question 10:

In the diagram, BD = 4 and point C is the midpoint of BD. If point A is placed so that ΔABC is equilateral, what is the length of AD?



Question 11:

There were 30 students in Miss Sun's class. The average mark of the students in the class was 80. After two students dropped the class, the average mark of the remaining students was 82. What is the average mark of the two students who dropped the class?

Question 12:

In the diagram, ABC is a quarter of a circular pizza with centre A and radius 20 cm. The piece of pizza is placed on a circular pan with A, B and C touching the circumference of the pan, as shown. What percentage of the pan is covered by the piece of pizza?

