Question 1:

Exactly three faces of a 2×2×2 cube are partially shaded, as shown. (Each of the three faces not shown in the diagram is not shaded.) What fraction of the total surface area of the cube is shaded?

A. $\frac{1}{3}$ B. $\frac{1}{4}$ C. $\frac{1}{6}$ D. $\frac{3}{8}$ E. $\frac{2}{3}$

Question 2:

Which of the following expressions is equal to an odd integer for every integer n?

A. $2017-3n$ B. $2017+n$ C. $2017n$ D. $2017+n^2$ E. $2017+2n$

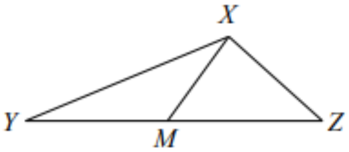
Question 3:

The average height of Ian, Jane and Bruce is 4% larger than the average height of Ian and Jane. If Ian and Jane are each 175 cm tall, how tall is Bruce?

A. 179cm B. 196cm C. 180cm D. 198cm E. 194cm

Question 4:

In the diagram, M is the midpoint of YZ, $\angle XMZ = 36^o$, and $\angle XYZ = 18^o$. The size of $\angle XZY$, in degrees is



A. 72 B. 56 C. 68 D. 64 E. 42

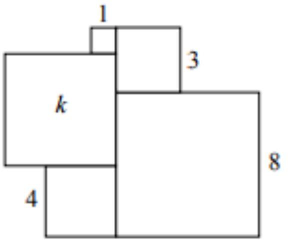
Question 5:

When two positive integers p and q are multiplied together, their product is 75. The sum of all of the possible values of p is

A. 96 B. 124 C. 109 D. 115 E. 48

Question 6:

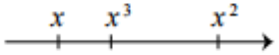
In the diagram, the side lengths of four squares are shown.
The area of the fifth square is k units².
What is the value of k?



A. 64　　B. 49　　C. 25　　D. 16　　E. 36

Question 7:

Given two different numbers on a number line, the number to the right is greater than the number to the left. The positions of x, x^3 and x^2 are marked on a number line. Which of the following is a possible value of x?



A. $\frac{1}{5}$　　B. $\frac{3}{2}$　　C. $\frac{-2}{5}$　　D. $\frac{-4}{3}$　　E. 2

Question 8:

For all values of m, $\frac{16^m - 4^m}{4^m}$ equals

A. $16^m - 1$　　B. 8　　C. 4　　D. $\frac{4^m - 1}{4}$　　E. $4^m - 1$

Question 9:

In the latest game of ten-pin bowling Esref scored 199 and this raised his average over a number of games from 177 to 178. To raise his average to 179 with the next game he must score

A. 179　　B. 180　　C. 199　　D. 200　　E. 201

Question 10:

The pair (x, y) = (2, 5) is the solution to the system of equations $\begin{cases} ax + 2y = 16 \\ 3x - y = c \end{cases}$

What is the value of $\frac{a}{c}$?

A. 3　　B. 4　　C. 5　　D. 6　　E. 8

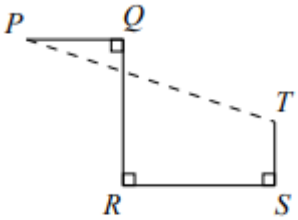
Question 11:

Teone wants to visit Singapore, Mongolia, Bhutan, Indonesia, and Japan. In how many ways can he order his trip to visit each country exactly once, with the conditions that he cannot visit Mongolia first and cannot visit Bhutan last?

A. 46 B. 54 C. 58 D. 62 E. 78

Question 12:

In the diagram, PQ is perpendicular to QR, QR is perpendicular to RS, and RS is perpendicular to ST. If $PQ = 4$, $QR = 8$, $RS = 8$, and $ST = 3$, then the distance from P to T is



A. 13 B. 12 C. 17 D. 15 E. 16

Question 13:

Grace received a mark of 50% on a recent test. Grace answered 13 of the first 20 questions correctly. Grace also answered 25% of the remaining questions on the test correctly. If each question on the test was worth one mark, how many questions in total were on the test?

A. 23 B. 38 C. 32 D. 24 E. 40

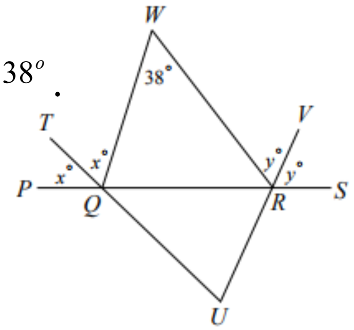
Question 14:

The expression $\frac{3^{2017}+3^{2017}}{3^{2016}+3^{2018}}$ is equal to

A. $\frac{3}{5}$ B. 1 C. $\frac{9}{10}$ D. $\frac{10}{3}$ E. $\frac{2}{3}$

Question 15:

In the diagram, points Q and R lie on PS and $\angle QWR = 38^o$. If $\angle TQP = \angle TQW = x^o$, $\angle VRS = \angle VRW = y^o$, and U is the point of intersection of TQ extended and VR extended, then the measure of $\angle QUR$, in degrees is



A. 71 B. 45 C. 76 D. 81 E. 60

Question 1:

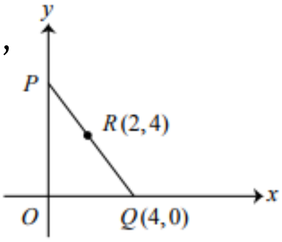
Last Thursday, each of the students in Mr Clark's class brought one piece of fruit to school. Each brought an apple, a banana, or an orange. In total, 20% of the students brought an apple and 35% brought a banana. If 18 students brought oranges, how many students were in the class?

A. 36 B. 64 C. 32 D. 30 E. 40

Question 2:

In the diagram, P lies on the y-axis, Q has coordinates (4, 0), and PQ passes through the point R(2, 4).

What is the area of ΔOPQ, in square units?



A. 8 B. 12 C. 32 D. 16 E. 25

Question 3:

The numbers $4x$, $2x - 3$, $4x - 3$ are three consecutive terms in an arithmetic sequence. What is the value of x?

(An arithmetic sequence is a sequence in which each term after the first is obtained from the previous term by adding a constant. For example, 3, 5, 7, 9 are the first four terms of an arithmetic sequence.)

A. $\frac{3}{4}$ B. $\frac{-3}{4}$ C. $\frac{-4}{3}$ D. $\frac{3}{2}$ E. $\frac{-3}{2}$

Question 4:

Suppose that a and b are integers with $4 < a < b < 22$. If the mean of the numbers

4, a, b, 22 is 13, then the number of possible pairs (a, b) is

A. 8 B. 10 C. 9 D. 7 E. 6

Question 5:

Colin runs 16 km in 1.5 hours. He runs the first 10 km at an average speed of 12 km/h. What is his average speed for the last 6 km?

A. 8 km/h B. 9 km/h C. 10 km/h D. 6 km/h E. 12 km/h

Question 6:

If x = 18 is one of the solutions of the equation $x^2 + 12x + c = 0$, the other solution of this equation is

A. x = 216 B. x = -6 C. x = -540 D. x = -30 E. x = 30

Question 7:

How many of the positive divisors of 128 are perfect squares larger than 1?

A. 2 B. 5 C. 1 D. 3 E. 4

Question 8:

A total of n points are equally spaced around a circle and are labelled with the integers 1 to n, in order. Two points are called diametrically opposite if the line segment joining them is a diameter of the circle. If the points labelled 7 and 35 are diametrically opposite, then n equals

A. 56 B. 55 C. 54 D. 58 E. 57

Question 9:

If $(x+a)(x+8) = x^2 + bx + 24$ for all values of x, then $a + b$ equals

A. 144 B. 32 C. 40 D. 16 E. 14

Question 10:

The regular price for a bicycle is $320. The bicycle is on sale for 20% off. The regular price for a helmet is $80. The helmet is on sale for 10% off. If Sandra bought both items on sale, what is her percentage savings on the total purchase?

A. 18% B. 12% C. 15% D. 19% E. 22.5%

Question 11:

$PQRS$ is a square. The midpoint of PQ is M and the midpoint of RS is N. If the perimeter of rectangle $PMNS$ is 36, the area of square $PQRS$, in square units is

A. 72 B. 81 C. 324 D. 144 E. 36

Question 12:

If $512^x = 64^{240}$, then x equals

A. 160 B. 30 C. 80 D. 360 E. 237

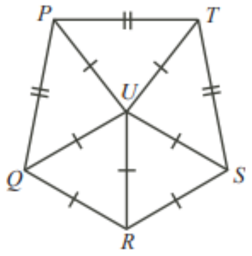
Question 13:

In a school fundraising campaign, 25% of the money donated came from parents. The rest of the money was donated by teachers and students. The ratio of the amount of money donated by teachers to the amount donated by students was 2 : 3. The ratio of the amount of money donated by parents to the amount donated by students was

A. 5 : 9 B. 20 : 9 C. 5 : 6 D. 1 : 2 E. 5 : 12

Question 14:

In the diagram, ΔQUR and ΔSUR are equilateral triangles. Also, ΔQUP, ΔPUT and ΔTUS are isosceles triangles with $PU = QU = SU = TU$ and $QP = PT = TS$.
The measure of $\angle UST$, in degrees, is



A. 70 B. 54 C. 50 D. 60 E. 80

Question 15:

There is one odd integer N between 400 and 600 that is divisible by both 5 and 11. The sum of the digits of N is

A. 11 B. 8 C. 10 D. 16 E. 18