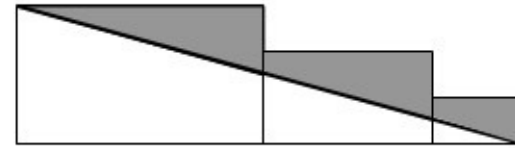


Question 1

Points A and B are located in 3-dimensional space. If A's location is at (3, 4, -1) and B's location is at (-5, -3, 4), find the length of AB. Express your answer in exact form.

Question 2

The left-most rectangle below has a height of 10 and width of 12, the middle rectangle has a height of 8 and width of 10, and the right rectangle has a height of 6 and width of 8. Find the total area of the shaded region in square units.



Question 3

X = the perimeter of an isosceles triangle with base 10 and area 60

Y = the exact length of \overline{BC} in triangle ABC where $m\angle B = 90$, $\overline{AC} = 7$, $\overline{AB} = 5$

W = the area of a triangle with vertices (0,0), (6,0), (0,4)

Z = the length of \overline{RQ} in $\triangle PQR$ when \overline{RS} is the altitude to hypotenuse \overline{PQ} , $\overline{PS} = 27$, $\overline{SQ} = 3$

Find the value of $Z \left(Y^2 - \frac{X}{W} \right)$

Question 4

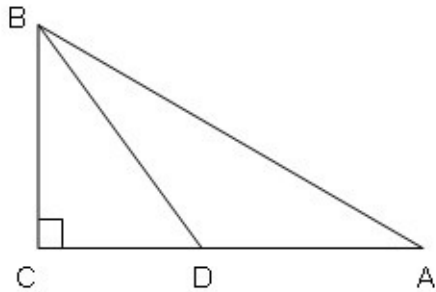
A = the area of a rectangle with length 6 more than twice the width and having a perimeter of 66

B = the length of a rectangle having the same area as a square with sides of length 16 when the width of the rectangle is $\frac{1}{4}$ of the length of the rectangle

If A and B are legs of a right triangle find the length of the hypotenuse rounded to the nearest tenth.

Question 5

In $\triangle ABC$ D lies between A and C . Also, $m\angle C = 90$, $m\angle A = 30$, $m\angle BDC = 60$, $BC = 5$. If the exact perimeter of $\triangle ADB$ is $R + S\sqrt{3}$, give the value of $R + S$

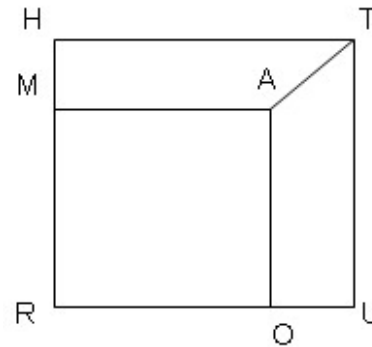


Question 6

Square RUTH has side length $\sqrt{10}$.

Square ROAM has side length $\sqrt{5}$

Find the exact area of trapezoid MATH in simplest form



Question 7

Assign the numbers 1, 2, 3, 4 to the four team members in a clockwise order and follow directions precisely.

1. Rotate your numbers clockwise by one seat.
2. Switch the even numbers.
3. Switch the prime numbers.
4. Switch the perfect squares.
5. Rotate your numbers counterclockwise.
6. Switch the triangular numbers.
7. Switch the numbers of those who had an even number initially.

Find the final number of the person who had the number 2 after step 2.

Question 8

For the following statements, assign it the value of 1 if it is always true, 0 if it is sometimes true, and -1 if it is never true. Find the sum of the values assigned to all of the statements.

- * An equilateral parallelogram is equiangular.
- * An equiangular rhombus is a square.
- * Adjacent angles are complementary.
- * An exterior angle of a triangle is complementary to some interior angle.
- * A kite is a square.
- * A trapezoid has congruent diagonals.
- * Two parallel lines are coplanar.
- * If the vertex angles of two isosceles triangles are congruent, then the triangles are similar.

Question 9

HINT: The area of a rhombus may be calculated by using $A = \frac{d_1 d_2}{2}$

where d_1 and d_2 are the 2 diagonals.

A = the length of the other diagonal for rhombus ABCD when AC=6 and AD=5

B = the exact area of a rhombus with one diagonal 12 and a side having length $3\sqrt{13}$

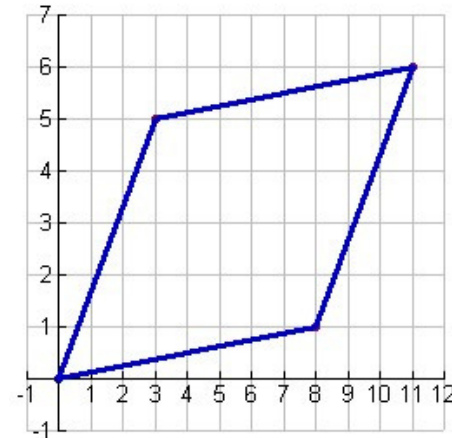
C = the exact area of a square with a diagonal of $6\sqrt{3}$

D = the exact ratio of the area of a square with side length 5 to the area of a rectangle with a length of 5 and a diagonal of 10.

Find the exact value of $\frac{B}{C} + A + D\sqrt{3}$

Question 10

Find the area of a parallelogram with vertices at (3,5), (8,1), (11,6) and the origin.



Question 11

A spherical ball of chocolate has a radius of 3 inches. The chocolate ball has a hollow center of radius 2 inches that contains a crème filling. What is the volume of the chocolate shell? (The shell is the part enclosed by both spheres)

Question 12

Isosceles right triangle ABC with hypotenuse \overline{AC} has an area of 20. Find the length of segment \overline{AC} in exact form.

Question 13

Carey drew a circle with center C and diameter 5 cm long. From an external point, both a tangent segment and a secant segment are drawn to the circle, the secant containing the diameter of the circle. If the length of the tangent segment is 3.5 cm more than the length of the radius of the circle, how far (in cm) from C is the external point?

Question 14

Given the volume of a right regular square pyramid is 384 cu in. and its altitude is 8 in.

A = the length of an edge of the base

B = the lateral surface area of the pyramid

Find the value of $\frac{B}{A}$