1. Edward starts at point A and walks due north at 3 mph. Two hours later, Ville starts at point A and walks due north at 4 mph. Find the number of **minutes** that Ville will walk before she catches Edward.

2. Five times a number added to twenty more than twelve times the number is ANS. Find the number.

3. The lengths of the diagonals of a rhombus are respectively ANS and 48. Find the area of the rhombus.

4. The perimeter of a regular hexagon is ANS. Find the positive difference between the radius of a circumscribed circle of this hexagon and the radius of an inscribed circle of this hexagon. Express your answer as a **decimal** rounded to the nearest hundredth.

1. If 13 is the first number in an arithmetic sequence and 22 is the third number in this arithmetic sequence, find the eleventh number in this arithmetic sequence.

2. Find the length of a radius of a circle whose equation is $x^2 + (ANS)x + y^2 = 183$.

3. Let $0^\circ < k^\circ < 540^\circ$. Find the sum of all distinct values of k such that $\cos(k)^\circ = \sin(ANS)^\circ$.

4. Let $f(x) = 3x + 7$ and $g(x) = 3.2x + 34.1$. Find the value of $f(g(ANS))$. Express your answer as an **exact decimal**.

1. Find the value of the difference of the determinants as shown:

$$\begin{vmatrix} 8 & 1 \\ 2 & 16.5 \end{vmatrix} - \begin{vmatrix} \frac{464}{9} & 0 \\ 403.1 & 2.25 \end{vmatrix}$$

2. The trinomial $x^2 - px + ANS$ factors over the integers into $(x-k)(x-w)$ where k and w are **positive** integers. Find the sum of all distinct possibilities for p .

3. If $C(n,r)$ represents a symbol for the combination of n things taken r at a time, find the smallest possible positive integer n such that $C(n,2) > ANS$.

4. In a random roll of two normal and fair cubical dice, find the probability that the sum of the number of dots showing on the upper faces is greater than ANS. Express your answer as a common fraction reduced to lowest terms.

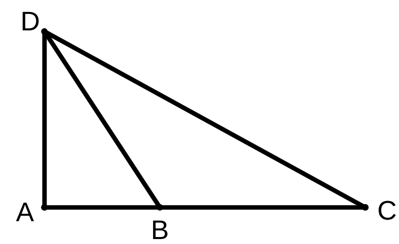
1. Let $f(x) = 17x + 8$. By how much does $3f(2)$ exceed $2f(3)$?

2. Let k, w, and p represent integers. The quartic equation $x^4 + kx^3 + wx^2 + px - 144 = 0$ factors into $(x^2 + (ANS)x - 48)(x^2 + x + 3) = 0$. One of the roots of that quartic equation is a positive integer. That integer is the length of a side of an equilateral triangle. Find the area of that equilateral triangle.

3. The points $(\sqrt{45}, -8\sqrt{3})$ and $(3\sqrt{5}, ANS)$ are the endpoints of a diameter of a circle. Find the *y*-coordinate of the center of this circle.

4. When simplified, ANS should be in the form $k\sqrt{w}$. Find the real value of x which is a solution of the equation $\sqrt{\left(\frac{1}{x}+1\right)}+\frac{1}{x}+1+kw=0$.

1. In right triangle *DAC*, $\angle DAC$ is a right angle. Point *B* lies on $\overline{AC}$ as shown. If *DA* = 8, *CD* = 17, and *DB* = 10, find BC.



2. *ANS* is the length of a leg in each of two right triangles. The hypotenuse of one right triangle has a length of 41, and the hypotenuse of the other right triangle has a length of 15. By how much does the length of the remaining leg of the larger right triangle exceed the length of the remaining leg of the smaller right triangle?

3. *ANS* is the sum of the terms of an infinite geometric sequence whose first term is 20. Find the ratio of the fourth term to the third term. Express your answer as a common fraction reduced to lowest terms.

4. The cosine of the largest **acute** angle of a right triangle is ANS. Find the sum of the sines of the other two angles of this right triangle. Express your answer as an improper fraction reduced to lowest terms.

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PROCTOR ANSWER SHEET

ROUND 1

1. 8
2. 80
3. -50
4. 9

ROUND 2

1. 58
2. 32
3. 778
4. 7578.1 (Must be this decimal.)

ROUND 3

1. 14
2. 24
3. 8
4. $\frac{5}{18}$ (Must be this reduced common fraction.)

EXTRA ROUND 4

1. 8
2. $4\sqrt{3}$
3. $-2\sqrt{3}$
4. $\frac{1}{3}$ OR $.\overline{3}$ OR $0.\overline{3}$

EXTRA ROUND 5

1. 9
2. 28
3. $\frac{2}{7}$ (Must be this reduced common fraction.)
4. $\frac{9}{7}$ (Must be this reduced improper fraction.)