

JV Math Meet – March 22, 2010

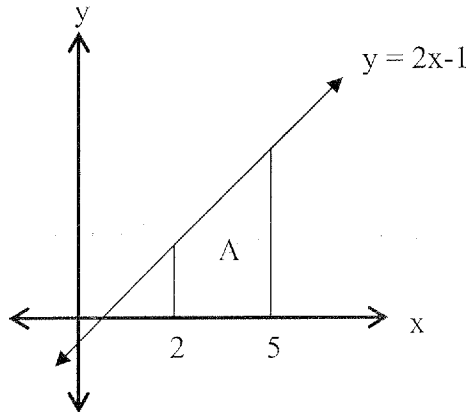
SCORE:

Student Name: _____ School: _____ Team #: _____

Event 1: (No Calculators) – All answers must be exact and fully simplified.

1. Simplify: $\left[2 + (6 - 3)^2\right] - 7\sqrt{5}$ 1. _____

2. Find the area of the enclosed region (A → from 2-5) below. 2. _____



3. A bag contains 35 green, some black, and 3 red marbles. Reaching in blindfolded, the probability of picking a red is $\frac{1}{23}$. How many black marbles are there? 3. _____

4. Solve (assume that $x \neq 1, -1$): $\frac{13}{x^2 - 1} - \frac{1}{4x + 4} = \frac{1}{4x - 4}$ 4. _____



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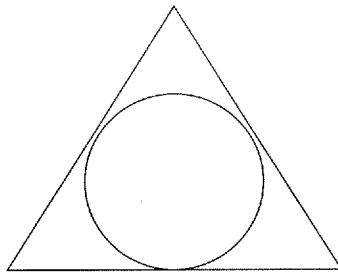
Student Name: _____ School: _____ Team #: _____

Event 2: (No Calculators) – All answers must be exact and fully simplified.

1. Simplify: $\frac{25}{1 + \frac{3}{3 + \frac{1}{4}}}$ 1. _____

2. In basketball, a “bonus” shot is offered where a player earns a second shot (cannot earn a third) after making the first shot. If the player misses the first shot, he/she does not get a second shot. Bob averages 70% shooting free throws. What is his probability of Scoring exactly one point? 2. _____

3. If the triangle below is equilateral and the circle’s area is 3π square units, What is the triangle’s perimeter? (Note: the sides of the triangle are tangent to the circle) 3. _____



4. Solve: $2^{\frac{x}{5} - .6} = 16$ 4. _____



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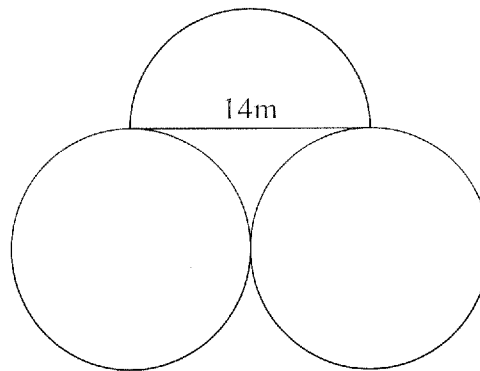
Student Name: _____ School: _____ Team #: _____

Event 3: (No Calculators) – All answers must be exact and fully simplified.

1. Express the y-intercept of the following as an ordered pair (x, y): 1. _____

$$5x + 2y - 18 = 0$$

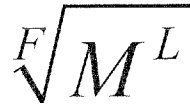
2. Find the Area of the shaded region below. Note: the three circles are congruent. 2. _____



3. State the solution(s) to the following system as ordered pair(s): 3. _____

$$\begin{cases} y = 2x + 3 \\ y = x^2 - 2x + 3 \end{cases}$$

4. The faucet of a certain tub fills the tub in 15 minutes. The shower fills the tub in 20 minutes. The drain empties the tub in 12 minutes. If everything is left open, how long (in minutes) will it take to fill the tub? 4. _____



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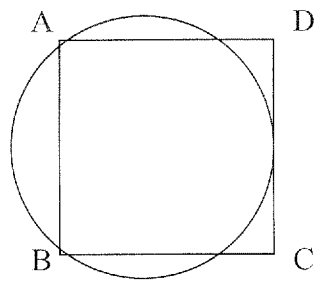
Event 4: (Calculators Allowed) – Round answers to the nearest hundredth if necessary. Completely simplify all answers.

1. A clock's minute hand is 8 inches long, and its hour hand is 6 inches long. From 1:00 pm to 1:20 pm, how many inches does the minute hand sweep at the tip? 1. _____

2. A plane flies out of Appleton traveling an average of 325 mph and reaches Baltimore in 3 hours and 24 minutes. On the return flight there is a tail wind that increases the plane's speed so it takes only 3 hours and 15 minutes to fly back to Appleton from Baltimore. What is the speed of the tailwind? 2. _____

3. A cylindrical block of cheese has a 6-inch diameter and is 2 inches thick. After a party, only a sector remains that has a central angle of 45° . Find the volume of the cheese that remains. 3. _____

4. Find the radius of the circle. The square has a side length of 14 ft. (points A and B are on the circle and CD is tangent to the circle) 4. _____



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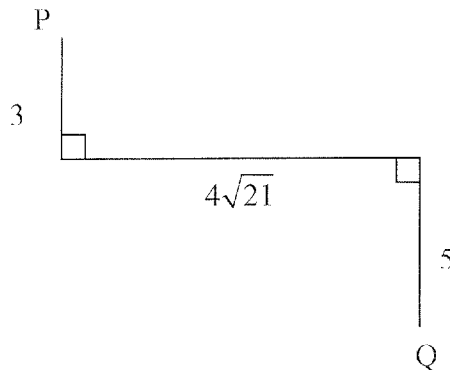
Team Event: (Calculators Allowed) – Round answers to the nearest hundredth if necessary. Completely simplify all answers.

1. Find $\sum_{n=0}^6 (3n - 5)$

1. _____

2. Find the length of PQ.

2. _____



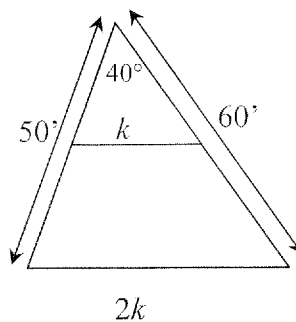
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3. Find the sum of all of the answers to: $(|x + 5| - 6)^2 + 4 = 20$

3. _____

4. Find the area of the shaded trapezoid.

4. _____





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Student Name: Key

School: _____

Team #: _____

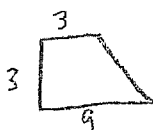
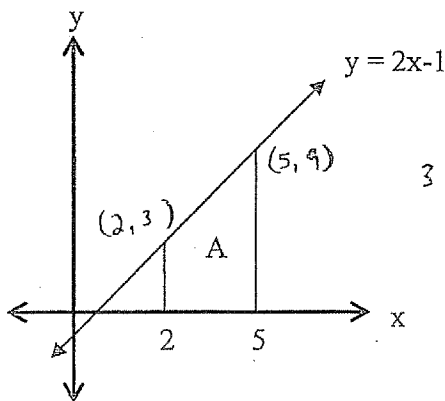
Event 1: (No Calculators) – All answers must be exact and fully simplified.

1. Simplify: $[2 + (6 - 3)^2] - 7 \cdot 5$

$$\begin{aligned} &(2 + 3^2) - 35 \\ &(2 + 9) - 35 \\ &11 - 35 \end{aligned}$$

1. -24

2. Find the area of the enclosed region (A → from 2-5) below.



$$\begin{aligned} A &= \frac{1}{2}h(b_1 + b_2) \\ A &= \frac{1}{2}(3)(9 + 3) \\ A &= 18 \end{aligned}$$

2. 18 units²

3. A bag contains 35 green, some black, and 3 red marbles. Reaching in blindfolded, the probability of picking a red is 1/23. How many black marbles are there?

35 Green
x Black
3 Red

$$P(\text{red}) = \frac{1}{23}$$

$$\frac{1}{23} = \frac{3}{y}$$

$$\begin{aligned} y &= 69 \text{ total marbles} \\ &\underline{-38} \\ &31 \end{aligned}$$

3. 31

4. Solve (assume that $x \neq 1, -1$): $\frac{13}{x^2 - 1} - \frac{1}{4x + 4} = \frac{1}{4x - 4}$

$$\left(\frac{4}{4}\right) \frac{13}{(x-1)(x+1)} - \frac{1}{4(x+1)} \left(\frac{x-1}{x-1}\right) = \frac{1}{4(x-1)} \left(\frac{x+1}{x+1}\right)$$

$$\frac{52}{4(x-1)(x+1)} - \frac{x-1}{4(x-1)(x+1)} = \frac{x+1}{4(x-1)(x+1)}$$

$$\begin{aligned} 52 - (x-1) &= x+1 \\ 52 - x + 1 &= x+1 \\ +x &\quad -x \\ \underline{52} &= \underline{2x} \\ 26 &= x \end{aligned}$$

4. 26



SCORE:

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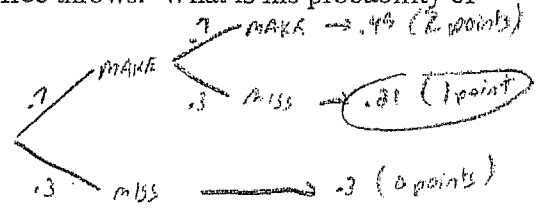
Event 2: (No Calculators) – All answers must be exact and fully simplified.

1. Simplify: $\frac{25}{1 + \frac{3}{3 + \frac{1}{4}}} = \frac{25}{1 + \frac{3}{\frac{13}{4}}} = \frac{25}{1 + \frac{12}{13}} = \frac{25}{\frac{25}{13}} = 13$

1. 13

2. In basketball, a "bonus" shot is offered where a player earns a second shot (cannot earn a third) after making the first shot. If the player misses the first shot, he/she does not get a second shot. Bob averages 70% shooting free throws. What is his probability of Scoring exactly one point?

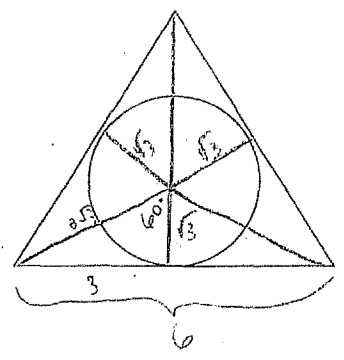
2. $\frac{21}{100} = .21 = 21\%$



3. If the triangle below is equilateral and the circle's area is 3π square units, What is the triangle's perimeter? (Note: the sides of the triangle are tangent to the circle)

3. 18 units

$A = 3\pi$
 $A = \pi r^2$
 $3\pi = \pi r^2$
 $3 = r^2$
 $r = \sqrt{3}$



4. Solve: $2^{\frac{x}{5} - .6} = 16$

4. x = 23

$2^{\frac{x}{5} - .6} = 2^4$
 $\frac{x}{5} - .6 = 4$
 $\frac{x}{5} = 4.6$
 $x = 23$

SCORE:

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Student Name: (Key)

School: _____

Team #: _____

Event 3: (No Calculators) – All answers must be exact and fully simplified.

1. Express the y-intercept of the following as an ordered pair (x, y):

1. (0, 9)

$$\frac{2y}{2} = \frac{-5x + 18}{2}$$

$$y = \frac{-5x}{2} + 9$$

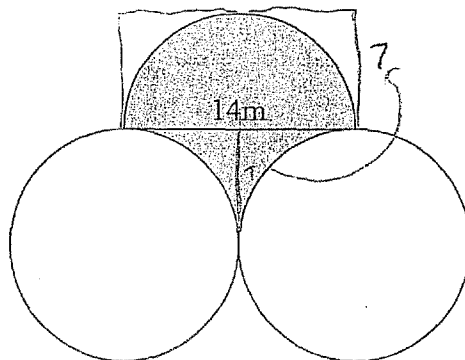
$$5x + 2y - 18 = 0$$

$$0 + 2y - 18 = 0$$

$$2y = 18$$

$$y = 9$$

2. Find the Area of the shaded region below. Note: the three circles are congruent.

2. 98 m²

$$7 \times 14 = 98 \text{ m}^2$$

3. State the solution(s) to the following system as ordered pair(s):

3. (0, 3) and (4, 11)

$$2x + 3 = x^2 - 2x + 3$$

$$0 = x^2 - 4x$$

$$0 = x(x - 4)$$

$$x = 0 \text{ or } x = 4$$

$$\begin{cases} y = 2x + 3 \\ y = x^2 - 2x + 3 \end{cases}$$

4. The faucet of a certain tub fills the tub in 15 minutes. The shower fills the tub in 20 minutes. The drain empties the tub in 12 minutes.

4. 30 minutes

If everything is left open, how long will it take to fill the tub? (in minutes)

faucet $r = \frac{1}{15}$

shower $r = \frac{1}{20}$

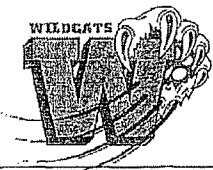
drain $r = -\frac{1}{12}$

$$\left(\frac{60}{15}\right) \frac{1}{15} x + \left(\frac{60}{20}\right) \frac{1}{20} x - \left(\frac{60}{12}\right) \frac{1}{12} x = 1(60)$$

$$4x + 3x - 5x = 60$$

$$2x = 60$$

$$x = 30$$



$\sqrt{M^L}$

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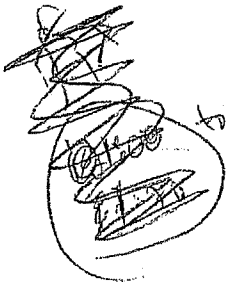
School: _____

Team #: _____

Event 4: (Calculators Allowed) – Round answers to the nearest hundredth if necessary. Completely simplify all answers.

1. A clock's minute hand is 8 inches long, and its hour hand is 6 inches long. From noon to 4:00 pm, how many inches does the minute hand sweep at the tip?

1. $\frac{16\pi}{3}$ or 16.76 in



$r = 8$ in
 $C = 16\pi$
 $\frac{4}{12} = \frac{1}{3} = 120^\circ$

2. A plane flies out of Appleton traveling an average of 325 mph and reaches Baltimore in 3 hours and 24 minutes. On the return flight there is a tail wind that increases the plane's speed so it takes only 3 hours and 15 minutes to fly back to Appleton from Baltimore. What is the speed of the tailwind?

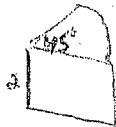
2. 15 mph

$d = r \cdot t$
 $d = 325(3.4)$
 $d = 1105$ miles
 $d = r \cdot t$
 $1105 = r(3.25)$
 $r = 340$
 $\begin{array}{r} 340 \\ -325 \\ \hline 15 \end{array}$

3. A cylindrical block of cheese has a 6-inch diameter and is 2 inches thick. After a party, only a sector remains that has a central angle of 45° . Find the volume of the cheese that remains.

3. $\frac{9\pi}{4} = 7.07$ in³

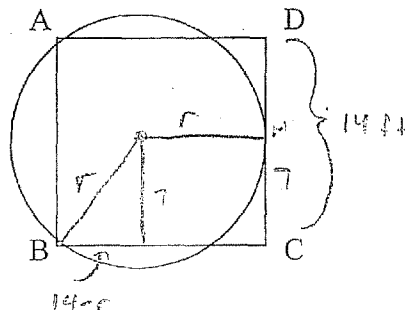
$(\frac{1}{8} \text{ of } 3\pi) \cdot 2$
 $\frac{9\pi}{4}$



4. Find the radius of the circle. The square has a side length of 14 ft. (points A and B are on the circle and CD is tangent to the circle)

4. $r = 8.75$ ft.

$(14-r)^2 + 7^2 = r^2$
 $196 - 28r + 49 = r^2$
 $245 = 28r$
 $8.75 = r$





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School: _____

Team #: _____

Team Event: (Calculators Allowed) - Round answers to the nearest hundredth if necessary. Completely simplify all answers.

1. Find $\sum_{n=0}^6 (3n-5)$

0	-5
1	-2
2	1
3	4
4	7
5	10
6	13

1. 28

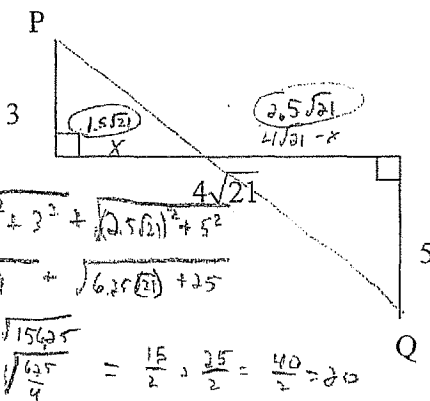
2. Find the length of PQ.

$$\frac{1}{x} = \frac{5}{\sqrt{21}-x}$$

$$12\sqrt{21} - 3x = 5x$$

$$\frac{12\sqrt{21}}{8} = \frac{8x}{8}$$

$$x = 1.5\sqrt{21}$$



2. 20

$$\sqrt{(1.5\sqrt{21})^2 + 3^2} + \sqrt{(2.5\sqrt{21})^2 + 5^2}$$

$$\sqrt{0.225(21) + 9} + \sqrt{6.25(21) + 25}$$

$$\sqrt{50.025} + \sqrt{156.25}$$

$$\sqrt{\frac{225}{4}} + \sqrt{\frac{625}{4}} = \frac{15}{2} + \frac{25}{2} = \frac{40}{2} = 20$$

3. Find the sum of all of the answers to: $(|x+5|-6)^2 + 4 = 20$

3. -20

$$(|x+5|-6)^2 = 16$$

$$|x+5|-6 = 4 \rightarrow |x+5| = 10$$

or

$$|x+5|-6 = -4 \rightarrow |x+5| = 2$$

$$x+5 = 10 \Rightarrow x = 5$$

$$x+5 = -10 \Rightarrow x = -15$$

$$x+5 = 2 \rightarrow x = -3$$

$$x+5 = -2 \rightarrow x = -7$$

4. Find the area of the shaded ~~region~~ ^{trapezoid}.

4. 723.14 ft²

$$A = \frac{1}{2}ab \sin C$$

$$A = \frac{1}{2}(150)(60) \sin 40$$

$$A = 1500 \sin 40$$

like A

$$A = \frac{1}{2}(35)(30) \sin 40$$

$$A = 375 \sin 40$$

$$\text{Area of Shaded} = 1500 \sin 40 - 375 \sin 40 = 1125 \sin 40$$

