

## ANSWERS MATH A – June 16<sup>th</sup>, 2005

- 1) This is an example requiring you to use the counting principle. If one thing can be done in m number of ways, and the other can be done in n number of ways, then both can be done in m times n number of ways. For this problem you multiply 2 x 4. The answer is 8.

**ANSWER: (1)**

- 2) You are given the formula  $t = \sqrt{\frac{d}{4.9}}$ . Time in seconds is represented by t, and d represents the distance the object will fall. You are asked to find the time (t) it will take an object to fall a distance (d) of 75 meters. Substitute 75 for d, and solve the formula.

$$t = \sqrt{\frac{75}{4.9}} = \sqrt{15.30612245} = 3.912303982 \text{ which is approximately } 3.9. \text{ ANSWER: (3)}$$

- 3) Choice number 1 is an example of the distributive property.  
Choice number 2 illustrates the Commutative property.  
Choice number 3 illustrates the Associative property.  
Choice number 4 shows that 0 is the additive identity. (0 property of addition).

**ANSWER: (1)**

- 4) In essence this problem is asking you to write 0.0000035 in scientific notation. Your answer will be  $3.5 \times 10$  to a power. To determine the power, imagine that you now have to move the decimal point from between the 3 and 5, back to the left to its original position. You would end up moving it 6 places to the left. This is indicated by  $-6$  or  $3.5 \times 10^{-6}$ .

**ANSWER: (3)**

- 5) There are easier ways to do this problem but using proportions will always work.

Let's set up the proportion using  $\frac{\text{milk}}{\text{flour}} \frac{1.5}{3} = \frac{x}{5}$  Now cross multiply

$$3x = (1.5)(5) \text{ Simplify}$$

$$3x = 7.5 \text{ Divide both sides by } 3$$

$$x = 2.5$$

**ANSWER: (4)**

- 6) To divide  $3x^2 - 6x$  by  $3x$ , divide each term by  $3x$ .

$3x^2$  divided by  $3x$  is  $x$  ( $3x$  time  $x$  is  $3x^2$ ).

$-6x$  divided by  $3x$  is  $-2$  ( $2$  times  $3x$  is  $6x$ ).

**x-2**

**ANSWER: (4)**

- 7) You are presented with a diagram of a parabola and a straight line. The straight line intersects the parabola at two points. These two points of intersection would be the solution to this particular system of equations.

**ANSWER: (2)**

- 8) The change in position shown in the diagram is an example of a translation. (The original "smiley" is simply moved a certain number of units in the y direction).

**ANSWER: (1)**

- 9) The mode is the item, in this case the data, that appears most often. 168 appears 3 times. No other weight appears that often.

**ANSWER: (4)**

- 10) You are presented with a triangle and told that it is isosceles. The two congruent sides are indicated. The angles opposite these congruent sides are the congruent base angles. This means that the  $42^\circ$  angle and angle y are congruent. In other words, angle  $y = 42^\circ$ .

Only one of the choices, choice 4, gives angle y as being 42. That is your answer.

You can calculate angle x as follows:  $180 - (42 + 42)$

**ANSWER: (4)**

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- 11) When subtracting, change the signs of all the terms of the subtrahend. Your starting number is the minuend.  $(x^2-5x-2) - (-6x^2-7x-3)$  becomes:

$$\begin{array}{r} x^2-5x-2 + 6x^2+7x+3 \\ 7x^2+2x+1 \end{array}$$

**ANSWER: (3)**

- 12) You are being asked to simplify the following expression:

$$\begin{array}{l} \sqrt{50} + \sqrt{32} \quad \text{Simplify each radical.} \\ \sqrt{25} \sqrt{2} + \sqrt{16} \sqrt{2} \quad \text{Continue simplifying.} \\ 5\sqrt{2} + 4\sqrt{2} \quad \text{Add.} \\ 9\sqrt{2} \end{array}$$

**ANSWER: (1)**

- 13) You are asked to solve for x:

$$\begin{array}{ll} 7x + 2a = 3x + 5a & \text{Subtract } 2a \text{ from both sides.} \\ 7x = 3x + 3a & \text{Subtract } 3x \text{ from both sides.} \\ 4x = 3a & \text{Divide both sides by 4.} \\ x = \frac{3}{4}a \text{ or } \frac{3a}{4} \end{array}$$

**ANSWER: (4)**

- 14) What is the solution set of:

$$\begin{array}{l} x^2+11x+28=0 \quad \text{Factor. We will use 7 and 4, as their product is 28 and their sum is 11.} \\ (x+7)(x+4)=0 \\ x+7=0 \quad x+4=0 \\ \mathbf{x=-7} \quad \mathbf{x=-4} \end{array}$$

**ANSWER: (2)**

- 15) The sum of any two sides of a triangle has to be greater than the third side.

Choice number two lists 2, 5, and 9 as the three sides.  $2 + 5$  is not greater than the third side of 9 and therefore cannot represent the sides of a triangle.

**ANSWER: (2)**

- 16) The sum of the measures of the interior angles of a polygon will be equal to 180 times the number of sides minus 2. A hexagon has 6 sides.  $6 - 2 = 4$ .  $180 \text{ time } 4 = 720$ . You are told that each tile is a regular hexagon. This means that each of its sides and angles will be congruent. So now divide 720 by 6 and you will know the degree measure of each interior angle of the hexagon. Angle ABC is an interior angle of the hexagon.

$$720 \text{ divided by } 6 = 120.$$

**ANSWER: (3)**

- 17) You are presented with a conditional statement. A conditional statement is false in only one case—when its first part (hypothesis) is true and its second part (conclusion) is false.

The given conditional is: If x is prime, then it is odd.

The number 2 is a prime number. (It happens to be the only EVEN prime number). So now, if x is 2 then the first part of the conditional is true—x is prime. The second part is “then it is odd.” This is false. Therefore, the conditional is false when x equals 2. **ANSWER: (2)**

- 18) You are asked to simplify  $\frac{(x^2)^3}{x^5} \cdot 1000$

$$(x^2)^3 = x^6 \quad \text{So you now have } \frac{x^6}{x^5} \text{ which equals } x^1 \text{ or simply } x. \text{ And } x \cdot 1000 = \mathbf{1000x}$$

**ANSWER: (1)**

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- 19) You are presented with 2 equations. Use the first one to solve for x, and then substitute for x in the second equation to solve for y.

$$-2x+3=7 \quad \text{Subtract 3 from both sides.}$$

$$-2x=4 \quad \text{Divide both sides by } -2.$$

$$x = -2$$

Now,  $3x+1=5+y$                       Substitute  $-4$  for x.

$$3(-2) + 1 = 5 + y \quad \text{Simplify.}$$

$$-6 + 1 = 5 + y \quad \text{Simplify.}$$

$$-5 = 5 + y \quad \text{Subtract 5 from both sides.}$$

$$-10 = y$$

**ANSWER: (3)**

- 20) When presented with a conditional and asked for its converse, simply switch the position of its hypothesis and conclusion. If P then Q becomes...If Q then P.

If it is Sunday, then I do not go to school, becomes "If I do not go to school then it is Sunday."

**ANSWER: (1)**

- 21) You are told that the point  $(-1,0)$  satisfies the equation  $y=2x+b$ . To find the value of b, substitute the given values for x and y.  $x=-1$  and  $y=0$

$$y = 2x + b$$

$$0 = 2(-1) + b$$

Multiply

$$0 = -2 + b$$

Add 2 to both sides

$$2 = b$$

**ANSWER: (2)**

- 22)  $|r|$  is read as the absolute value of r.

You are asked to find the value of  $|r| - |s|$

You are also given that  $r = 2$  and  $s = -7$                        $|2| = 2$      $|-7| = 7$

$$|2| - |-7| = 2 - 7 = -5$$

**ANSWER: (2)**

- 23) **Choice #1 is the graph of  $x = 2$**  (vertical line in which every point has an x-value of 2)  
 Choice #2 is the graph of  $y = -2$  (horizontal line in which every point has a y-value of  $-2$ )  
 Choice #3 is the graph of  $x = -2$  (vertical line in which every point has an x-value of  $-2$ )  
 Choice #4 is the graph of  $y = 2$  (horizontal line in which every point has a y-value of 2)

**ANSWER: (1)**

- 24) Triangle on scale drawing has lengths of 8, 15, and 17. We can figure out its perimeter by adding all the sides. The drawing of the triangle has a perimeter of  $8+15+17$  or 40.

The actual triangular playground has a perimeter of 120. What is the length of its longest side?. Let's set up a proportion realizing that the perimeter of similar triangles will be in the same ratio as their corresponding sides.

$$\frac{\text{scale drawing}}{\text{actual triangle}} \quad \frac{40}{120} = \frac{17}{x} \quad \text{Cross multiply}$$

$$40x = (17)(120)$$

$$40x = 2040$$

Divide both sides by 40.

$$x = 51$$

**ANSWER: (4)**

- 25) When two odd integers are multiplied, the product will always be an odd integer.

This is shown by choice 3,  $a \cdot b$ , where a and b are odd integers.

**ANSWER: (3)**

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- 26) The diagonals of both a square and a rhombus will be perpendicular. However of the choices given, only in a square will the diagonals be congruent as well. **ANSWER: (2)**

- 27) To find the area of a square, square the length of its side. The length of the square window is given as  $2x-1$ . Its area will therefore be  $(2x-1)(2x-1)$  which equals  $4x^2-4x+1$ . **ANSWER: (4)**

- 28) Perpendicular lines have slopes that are negative reciprocals. This means that their product will equal  $-1$ . You are given the line whose equation is  $-2y=3x+7$ . First divide each term by  $-2$  so that the equation will be in the form of  $y=mx+b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$  intercept. The equation then becomes:

$$y = -\frac{3}{2}x - \frac{7}{2} \quad \text{This shows that the slope of this particular line would be } -\frac{3}{2}.$$

The negative reciprocal of  $-\frac{3}{2}$  is  $\frac{2}{3}$  because  $-\frac{3}{2} \cdot \frac{2}{3} = 1$ . A line with a slope of  $\frac{2}{3}$  will be perpendicular to the line represented by the original equation.  $y = \frac{2}{3}x - 3$  represents a line whose slope is  $\frac{2}{3}$ , and is therefore the answer. **ANSWER: (3)**

- 29) As in the first question on this regents, again use the counting principle. The probability of winning the first game is given as  $\frac{1}{3}$ . The probability of winning the second game is  $\frac{3}{7}$ . The probability of winning both games is the product of both probabilities or:

$$\frac{1}{3} \cdot \frac{3}{7} \text{ or } \frac{3}{21} \text{ which can reduce to } \frac{1}{7}. \quad \text{ANSWER: (2)}$$

- 30) The formula for the volume of a cylinder is given as:  $V = \pi r^2 h$   
In our case, the radius  $r$  is 4 (half of the given diameter of 8). The height  $h$  is given as 10. The formula again is :

$$V = \pi r^2 h \quad \text{Substitute}$$

$$V = \pi (4)^2 (10) \quad \text{Use the pi key on your calculator}$$

$$V = 502.65482 \quad \text{Round to the nearest hundredth}$$

$$V = 502.65$$

**ANSWER: (4)**

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- 31) The ribbon is given as being 56 centimeters long. You are told that one piece is three times longer than the other.

Let  $x$  = length of first piece

$3x$  = length of second piece

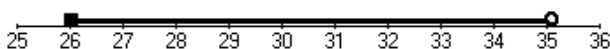
$x + 3x = 56$  The sum of the two pieces equals the original length.

$4x = 56$  Divide both sides by 4

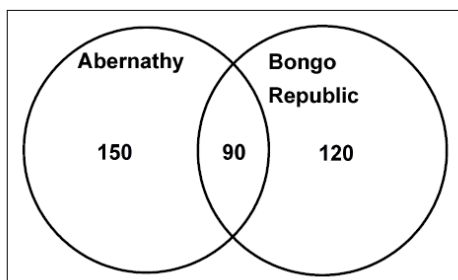
$x = 14$ .

**One piece will equal 14 centimeters long and the other will be three times as long or 14(3) or 42 centimeters long.**

- 32) You want to graph the inequality that shows the tire pressure as being greater than or equal to 26 but less than 35. The graph is pictured below. Since the pressure should be at least 26, the graph begins at 26 and the 26 itself is in bold—filled in. The bold line continues moving towards the right closer and closer to 35. However, we do not want the pressure to reach 35. That is why the 35 is depicted by an empty circle rather than a filled bold one.



- 33) One simple way of doing this problem is by using a Venn diagram.



Begin by filling in the 90 which is the number who shopped at both stores. Next put 150 in the Abernathy circle. This 150 and the 90 indicate that 240 shopped at Abernathy's, which is what you were told. Next enter 120 in the Bongo Republic circle. This 120 and the 90 indicate that a total of 210 shopped there. The question is how many shopped at **neither** store? Add up the numbers you have:  $150 + 90 + 120 = 360$ .

But you know there are a total of 400 who participated in the survey. That means there are 40 missing. **These are the 40 who did not shop at either store.**

- 34) There are a total of 21 students. You want to know how many groups of 5 are possible. The answer can be found by figuring out how many combinations of 5 are possible. This is a combination problem rather than a permutation because the order of the 5 students makes no difference.  ${}_{21}C_5 = \frac{{}_{21}P_5}{5!} = \frac{21(20)(19)(18)(17)}{5(4)(3)(2)(1)} = \mathbf{20349}$

Obviously, you can also use your calculator to compute the value of  ${}_{21}C_5$ .

- 35) Factor completely:

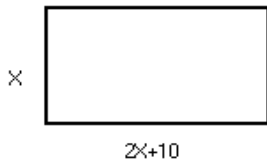
$3x^2 + 15x - 42$  Factor out a 3 from each term.

$3(x^2 + 5x - 14)$  Factor the quadratic into two binomials. Use 7 and 2.  $7(2) = 14$ .  $7 - 2 = 5$ .

$3(x + 7)(x - 2)$

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- 36) You are told that the length of a rectangular garden is 10 feet more than twice its width.

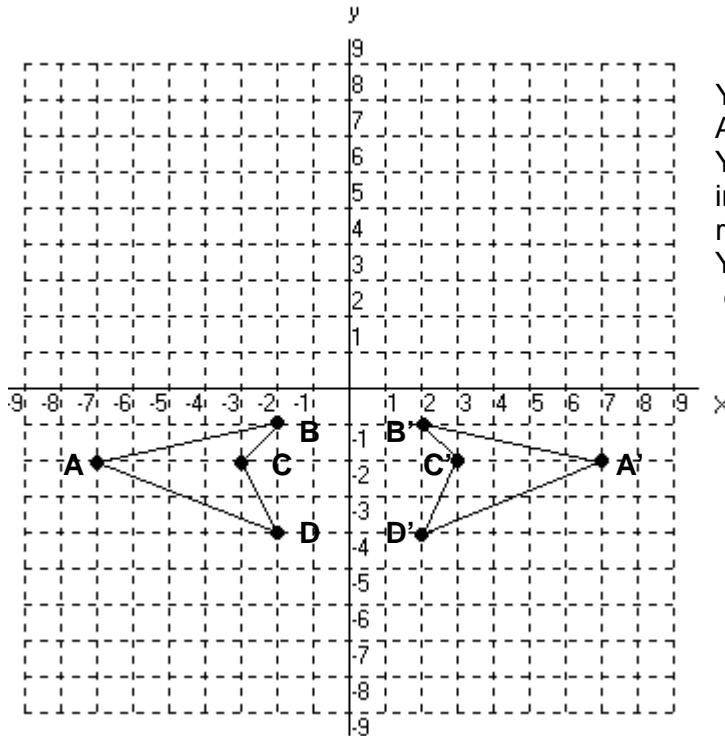


You have 80 feet of fencing to enclose this garden. This means that its perimeter will be 80. To find the perimeter, we add all four sides.

$$\begin{aligned}
 x + x + 2x+10 + 2x+10 &= 80 && \text{Combine} \\
 6x + 20 &= 80 && \text{Subtract 20 from both sides} \\
 6x &= 60 && \text{Divide both sides by 6} \\
 x &= 10
 \end{aligned}$$

**The width  $x$  is 10 feet.**  
**The length  $2x+10$  is  $2(10) + 10$  or 30 feet.**

- 37)



You are presented with figure ABCD as pictured at the left. You are asked to draw its reflection in the y-axis. It's reflection is represented by the points A'B'C'D'. You are also asked to state the coordinates of the reflected figure.

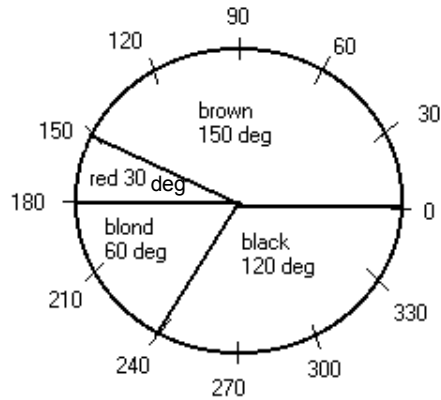
- A' (7,-2)**
- B' (2,-1)**
- C' (3,-2)**
- D' (2,-4)**

- 38) You are told that there are a total of 24 students and are given their breakdown according to hair color. You are also presented with a circle with degree markings and are asked to construct a circle graph based on the given information. A complete circle consists of  $360^\circ$ . All you have to do for this problem is to figure out what part of the total number of students is contained in each group of hair color.  $10/24$  have brown hair. To figure out what part of 360 degrees that represents, multiply  $360$  by  $10/24$ . Do the same for each hair color.

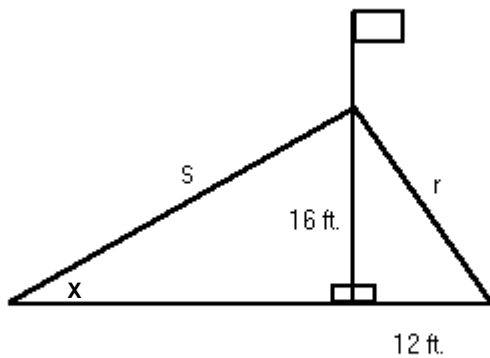
$$\begin{aligned}
 \text{Brown hair: } \frac{10}{24} (360) &= 150^\circ && \text{Black hair: } \frac{8}{24} (360) &= 120^\circ \\
 \text{Blond hair: } \frac{4}{24} (360) &= 60^\circ && \text{Red hair: } \frac{2}{24} (360) &= 30^\circ
 \end{aligned}$$

Look at the next page for the circle graph that depicts the above information.

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39)



What is important to remember for this problem is that the combined lengths of the two cables,  $r$  and  $s$ , is 50 feet. In other words,  $r + s = 50$ . The 12 feet you see at the bottom right is the base of the small triangle only, as indicated on the regents problem. For step # 1, let's figure out the length of  $r$ . This is easy, as we can use the Pythagorean Theorem. Actually it is even easier if you recognize the triangle as being a 3, 4, 5 right triangle. The 12 is  $3(4)$ , the side of 16 is  $4(4)$ , while  $r$  will have to be  $5(4)$  or 20. But let's go back to the Pythagorean Theorem:

$$\begin{aligned} (12)^2 + (16)^2 &= r^2 \\ 144 + 256 &= r^2 \\ 400 &= r^2 \quad \text{Find the square root of both sides} \\ r &= 20 \end{aligned}$$

Now, once you know that  $r$  is 20, you know that  $S$  is 30 since their sum was given as 50. You now have enough information to determine the degree measure of angle  $X$ . (You will now use the right triangle at the left whose hypotenuse is 30 and one of whose other sides is 16.) Simply use the sine ratio which is represented by measure of the opposite side over (divided by) the measure of the hypotenuse. In the case depicted by the above triangle:

$\sin x = \frac{16}{30}$  Now use the  $\sin^{-1}$  key on your calculator to determine the angle measure whose sine will equal  $\frac{16}{30}$ .  $X = 32.23095$  degrees. To the nearest degree your answer would be **32 degrees**.