A Droodle for the S.A.T. Math Exam without a calculator

A puzzle by David Pleacher



"A Droodle is a borkley looking sort of drawing that doesn't make

any sense until you know the correct title." – Roger Price

Caption for the picture:

 **E S K I M O A P A R T M E N T H O U S E**

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20 13 12 1 9 18 16 8 7 17 4 11 14 5 2 19 3 15 6 10

 I 1. On Sunday afternoon, Jackson sent *m* text messages each hour for

5 hours, and Kate sent *p* text messages each hour for 4 hours. Which of the following represents the total number of messages sent by Jackson and Kate on Sunday afternoon?

 Jackson sent *m* messages for 5 hours for a total of 5*m* messages

 while Kate sent *p*  messages for 4 hours for a total of 4*p* messages.

 So the answer is 5*m* + 4*p* messages.

 T 2. *g*(x) = *ax*2 + 24

 For the function *g(x)*, *a* is a constant and *g*(4) = 8.

 What is the value of *g*(-4) ?

 Substitute 4 for x in the original function:

*g*(4) = *a*(4)2 + 24 and set it equal to 8.

16*a* + 24 = 8. So a = -1.

Therefore, *g*(-4) = (-1)(-4)2 + 24 = -16 + 24 = 8.

\_O\_ 3. 

 Which of the following is equivalent to the preceding expression?

 Collect li *x*2*y* ke terms:

 *x*2*y* + *x*2*y* - 3*y*2 + 3*y*2 + *5xy*2 - 3 *xy*2

 2 *x*2*y* + *2xy*2

\_T\_ 4. If  and , what is the value of *y*?

 Substitute 3 for h: 

 Then multiply by 3: *y* – 1 = 9, so *y* = 10

\_N\_ 5. 

 What is the solution (x, y) of the system of equations?

 Multiply the top equation and 3, then subtract the bottom equation:

 

\_S\_ 6. Refer to the figure below:

 

 Which of the following is an equation of the line l ?

 The slope is 1 and the y-intercept is 1, so the equation is

 y = x + 1

\_A\_ 7. What are the solutions of the quadratic equation 4x2 – 8x = 12 ?

 Divide each side by 4 to get x2 – 2x – 3 = 0

 Factor to get (x – 3) (x + 1)

 So, x = –1 and x = 3

\_P\_ 8. Which of the following is an example of a function whose graph has no x intercepts?

A quadratic function with no real zeros .

That means the function does not intersect the x-axis.

\_M\_ 9. Refer to the figure below.

 

The circle above with center O has a circumference of 36. What is the length of minor arc  ?

 The arc AC represents ¼ of the circle, so the length of the arc is ¼ of the

 circumference = ¼ (36) = 9.

\_E\_ 10. The volume of right circular cylinder A is 22 cubic centimeters.

 What is the volume, in cubic centimeters, of a right circular cylinder

 with twice the radius and half the height of cylinder A?

The volume of a cylinder is given by the formula: .

Now take twice the radius and half the height to get: 

Simplify to get 

Since the new volume is twice as large as the original volume, the

 new volume is 2 x 22 = 44 cubic centimeters.

\_M\_ 11. The expression  where x >1 and y>1, is equivalent to which

 of the following?



\_K\_ 12. Which of the following expressions is equivalent to  ?

 Divide using long division:

 

 This is equivalent to 

\_S\_ 13. The expression  can be rewritten as , where *k* is a

 positive constant. What is the value of *k* ?



 So, *k* =

 E 14. In the figure below,  and  intersect at point *P*, *NP* = *QP*, and

 *MP* = *PR*. What is the measure, in degrees, of ?

 

 since it is a supplement to 60 degrees.

Since *MP* = *PR*, that makes 

So, = 30 degrees.

\_U\_ 15. The number of radians in a 720 degree angle can be written as ,

 where *a* is a constant. What is the value of *a* ?

 

\_A\_ 16.

 

A system of three equations is graphed above in the x y plane.

How many solutions does the system have?

Just one point where all three equations intersect (-1, 3)

\_R\_ 17. Which of the following represents all the possible values of x that satisfy

 the following equation?



 Divide 5x by 5 to get *x*. The multiply each side by *x* – 3:



So, x = 0 and 4

\_O\_ 18. Given the expression  for x > 0, which of the following is an

 equivalent expression?

 = 

 H 19. The graph of the function f below is a parabola.

 Which of the following defines f ?

 

 Answer is 

\_E\_ 20. The graph of the linear function *f* is shown in the following diagram.

 The graph of the linear function *g* (not shown) is perpendicular to

 the graph of *f* and passes through the point (1, 3).

 What is the value of *g(0)* ?

 

