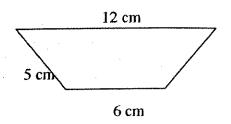
## UTAH STATE MATH CONTEST AT THE UNIVERSITY OF UTAH

## MARCH 16, 2006 GRADES 7-9

1.	The date is 03/16/2006. How many of the first ten counting numbers are factors of 3,162,006?							
:	a. 3	b. 4	c. 5	d. 6 e	. 7			
2.	•			e product of the two wer page number?	pages facing on			
	a. 62	b. 51	c. 104	d. 53	e. 52			
3.	Given the array on the right and the rules below, how many different paths can you take to spell UTAHMATH?  • Begin at the top. • Move only down. • For each move, go to one of the one or two letters directly below the letter you are on.			U T T A A A H H H H M M M M A A A A T T T H H				
	a. 2	b. 10	ć. 20	d. 35	e. 70			
1.	Convert 1.2	5 to a fraction						
	<b>a.</b> $1\frac{1}{3}$	b. 1 <sup>26</sup>	c 1 13	d 1 5	e 14			
	3	99	50	33	15			

5. Find the area of this isosceles trapezoid:



- a. 28 cm<sup>2</sup>
- b. 36 cm<sup>2</sup>
- c. 45cm<sup>2</sup>
- d. 48 cm<sup>2</sup>
- e. 60 cm<sup>2</sup>

6. Given a triangle, ΔABC such that angles A, B, C, measure respectively 50°, 60° and 70°, which side of the triangle is the longest?

- a.  $\overline{AB}$
- b.  $\overline{AC}$
- c.  $\overline{BC}$
- d. All sides are the same length
- e. There is not enough information.

7. Students in Ms. Ramirez's math class scored the following totals on a test: 85, 84, 69, 91, 80, 77, 92, 80, 76, 96. What was the median score?

- a. 85
- b. 84
- c. 82
- d. 80
- e. 83

8. Aziz is putting triangles together using toothpicks. If he follows this pattern, how many toothpicks will it take to make fifty attached triangles?



1 triangle 3 toothpicks

2 triangles 5 toothpicks



3 triangles 7 toothpicks

- a. 101
- b. 100
- c. 99
- d. 53
- e. 51

9. At the pizza parlor, they offer four possible toppings. How many different pizzas can be ordered assuming that you may have from 0 to 4 toppings?

- a. 5
- b. 8
- c. 10
- d. 16
- e. 32

10.	A student takes a 30-question math test where they got n questions correct, m questions incorrect and they left k questions blank. If correct answers are worth 4 points, incorrect answers are worth -1 points and blank answers worth zero points, write an expression to describe the student's total score.								
	a. n-4m+k	b. n+m+k=30	c. n-m	d. 4n-r	m e.	n+m+k			
		•				·			
11.	How many ways can you make change for a quarter using pennies, nickels and dimes?								
	a. 2	b. 3	c. 9	d. 10	e.	12			
12.	time and line t	contains the three them up from left to the word "mom?"	letters of the w	ord "mom." If pick them up, wl	you take one l hat is the proba	etter out at a			
	a. 1/6	b. 1/4	c. 1/3	<b>d</b> . 1	1/2	e. 1			
13.	Today is March 16 <sup>th</sup> which is a Thursday. On what day of the week will August 2 <sup>nd</sup> fall?  a. Monday b. Wednesday c. Friday d. Sunday e. None of the previous								
14.	450 students ar Every other stu	e surveyed as they of dent liked math, ev many students did	enter the cafeto	eria about which nt liked English	choices.  subjects they and every fiftl	liked.			
	a. 120	b. 105	. 315	d. 135	e. 150				

15. What is the area of a regular octagon with sides 3 in?

a.  $(15+12\sqrt{3})\text{in}^2$  b.  $(15+15\sqrt{3})\text{in}^2$  c.  $(13.5+18\sqrt{2})\text{in}^2$  d.  $(18+18\sqrt{2})\text{in}^2$  e.  $(27+6\sqrt{2})\text{in}^2$ 

16. What is the least common multiple of the first ten counting numbers?

a. 1

b. 5040

c. 2520

d. 840

e. 1260

17. What is the greatest common factor of 8! and  $4^3$ ?

a. 8!

b. 2<sup>6</sup>

c.  $2^4$ 

d.  $2^8$ 

e. 4

18. If three fair dice are tossed and the product of the numbers that appears is even, what is the probability that the sum of the numbers is also even?

a. 1/2

b. 3/4

c. 5/8

d. 3/7

e. 4/7

19. A store has a five-day sale where all merchandise is discounted by 1/3 on the first day. Beginning on the second day and each day thereafter, they take an additional 10% off the previous day's price. What will you pay for a \$120 item on the third day? (Round your answer to the nearest whole dollar.)

a. \$58

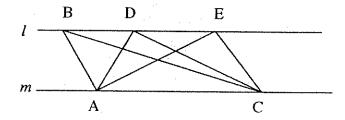
b. \$55

c. \$65

d. \$64

e. \$56

Given that the lines l and m are parallel, which of the three triangles has the greatest area,  $\triangle$ ABC,  $\triangle$ ADC,  $\triangle$ AEC?



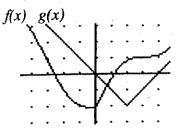
- a.  $\triangle ABC$ b. ΔADC c. ΔAEC d. The areas are all the same.
- e. There is not enough information.
- 21. If the altitude (height) of an isosceles triangle equals the base and each is numerically equal to the area, what is the area?
  - a. 2 units<sup>2</sup> b. 1 units<sup>2</sup> c. 8 units<sup>2</sup> d. 4 units<sup>2</sup>

- e. 16 units<sup>2</sup>

- 22. If  $\frac{x}{y} = \frac{3}{2}$  and  $\frac{y}{z} = \frac{2}{7}$ , then what does  $\frac{x}{z}$  equal?
  - a.  $\frac{4}{21}$  b.  $\frac{7}{3}$  c.  $\frac{21}{4}$  d.  $\frac{5}{14}$  e.  $\frac{3}{7}$

- 23. A reservoir has vertical sides measuring 20 meters and a rectangular base that measures 30 meters by 40 meters. At the beginning of the summer the reservoir was filled to capacity. At the end of the summer the water depth was 4 meters. How much water was used?
  - a.  $19,200 \text{ m}^3$  b.  $4,800 \text{ m}^3$  c.  $28,800 \text{ m}^3$  d.  $4,640 \text{ m}^3$  e.  $24,000 \text{ m}^3$

Given f(x) and g(x) as pictured at 24. the right, determine f(-1)+g(3)



- a. 0
- b. 3
- c. -3
- d. -2
- e. 2
- If the perimeter of an equilateral triangle with side x is equal to the perimeter of a square 25. with sides s, what does x equal in terms of s?
- a.  $x = \sqrt{s}$  b.  $x = \frac{9s}{16}$  c.  $x = \frac{s}{12}$  d. x = s-1 e.  $x = \frac{4s}{3}$
- Suppose you have a standard deck of 52 playing cards. Find the probability of drawing either a queen or a club.
  - a. 4/13
- b. 17/52
- c. 1/26
- d. 9/26
- e. 9/13
- Two opposite sides of a square are increased by 25% and the other two are decreased by 27. 40%. What is the percent decrease in the area of the resulting rectangle?
  - a. 2.25%
- b. 15%
- c. 25%
- d. 40%
- e. 75%

- An equilateral triangle is inscribed in a circle. What is the ratio of the area of the triangle to the area of the circle?
- b.  $\frac{2}{\pi}$  c.  $\frac{2\sqrt{3}}{\pi}$  d.  $\frac{3\sqrt{3}}{4\pi}$
- e. There is not enough information.

Suppose it takes h minutes to fill a bath tub using the hot water faucet and c minutes to fill 29. the same tub using the cold water faucet. Starting with an empty tub, the hot water faucet is turned on and then after 1 minute, the cold water faucet is also turned on. How long will it take to fill the tub?

a. 
$$\frac{h+(c-1)}{2}$$
 b.  $\frac{h(c+1)}{2}$  c.  $\frac{h(c+1)}{h+c}$  d.  $\frac{hc}{c+h}$  e.  $\frac{hc}{h+c}-1$ 

$$b. \frac{h(c+1)}{2}$$

c. 
$$\frac{h(c+1)}{h+c}$$

d. 
$$\frac{hc}{c+h}$$

e. 
$$\frac{hc}{h+c}-1$$

**30.** Find x if 
$$x + \sqrt{x + \sqrt{x + \sqrt{x + \dots}}} = 2$$

a. 
$$\pm\sqrt{2}$$

b. 
$$2 \pm \sqrt{2}$$

c. 
$$\frac{1}{2}$$

d. 
$$2 \pm 2i\sqrt{2}$$
 e.  $2 - \sqrt{2}$ 

e. 
$$2 - \sqrt{2}$$