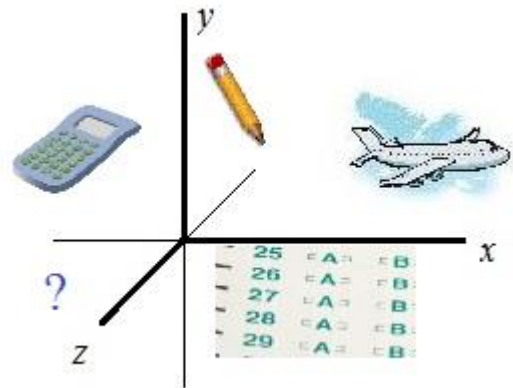
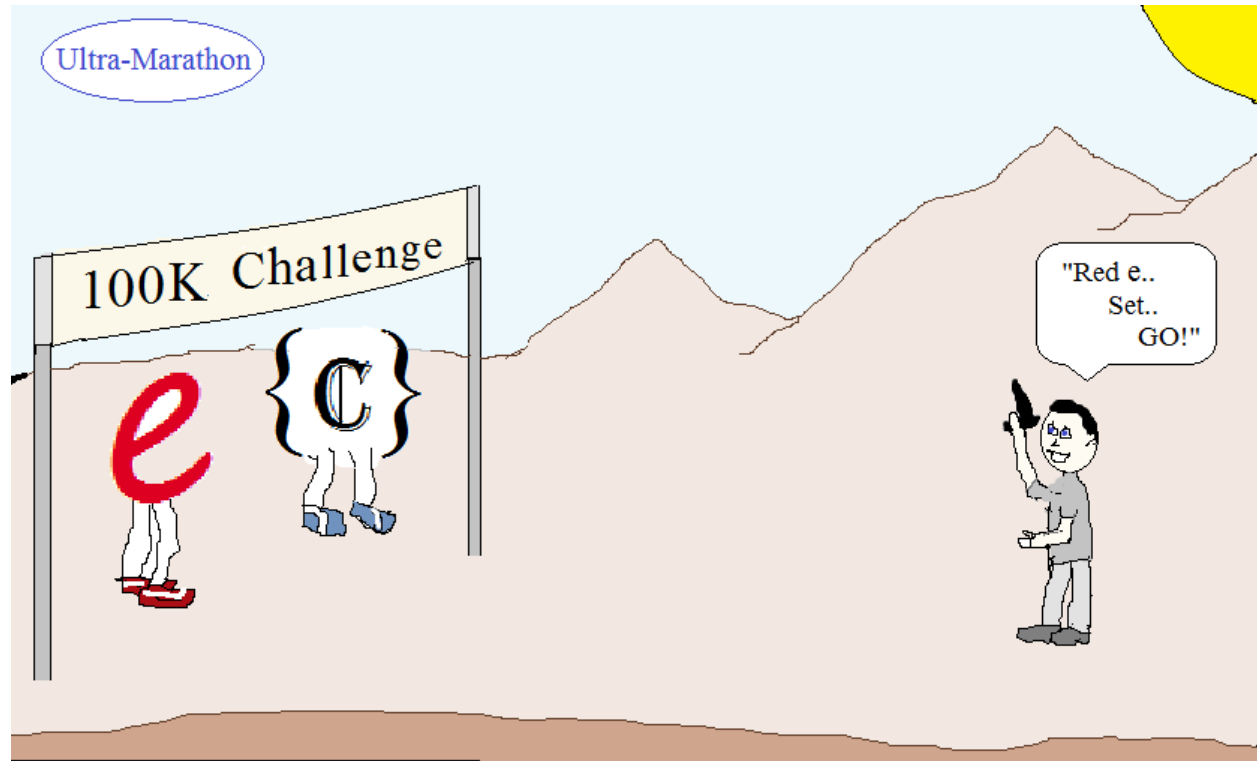


# ACT & SAT

## TOPICS TO KNOW

A list of algebra, geometry, and trigonometry subjects with sample questions (and solutions)





Testing the limits of endurance,  
these math figures will run on and on...

LanceAF #87 5-24-13  
[www.mathplane.com](http://www.mathplane.com)

# ACT Topics to Know...

ACT topics to know
--------------------

1)  $3.41 \times 0.002 =$

- a)  $6.82 \times 10^{-4}$
- b)  $6.82 \times 10^{-3}$
- c)  $6.82 \times 10^{-2}$
- d)  $6.82 \times 10^2$
- e)  $6.82 \times 10^3$

Decimals and Scientific Notation

2)  $\sqrt{200}$  is closest to which number?

- a) 13
- b) 13.5
- c) 14
- d) 14.5
- e) 15

Square roots and estimation

3) Which is NOT a factor of 252?

- a) 2
- b) 3
- c) 5
- d) 6
- e) 7

Factors/GCF/LCM

4) 40 is 2% of what number?

- a) 8
- b) 80
- c) 800
- d) 2000
- e) 8000

Percentages

5) A standard die has 6 sides. What is the probability of rolling a 5 and then a 6?

- a)  $1/2$
- b)  $1/3$
- c)  $1/6$
- d)  $1/18$
- e)  $1/36$

Probability

6) What is the mean of the following set:  $\{5, 7, -3, 0, 7, 8, -24\}$  ?

Statistical Data

- a) -2
- b) 0
- c) 5
- d) 7
- e) 29

7)  $\frac{(x^2yz)^3}{2} \cdot (4xy^3z)^2$

Exponents and Order of Operations  
(PEMDAS)

- a)  $2x^5y^7z^8$
- b)  $4x^8y^9z^5$
- c)  $4x^5y^8z^5$
- d)  $8x^7y^8z^5$
- e)  $8x^8y^9z^5$

8) For the equation  $y = -3x + 5$ :

Algebra and Substitution

If  $x$  is  $(2a - 3)$ , what is  $y$ ?

- a)  $-6a + 2$
- b)  $-6a + 14$
- c)  $8a$
- d)  $14a$
- e)  $16a + 2$

9) Solve  $x^2 + x = 12$

Factoring Quadratics

- a) 3
- b) 4
- c) 3 and -4
- d) -3 and 4
- e) 3 and 4

10)  $(3x - 5)^2 =$

FOIL

- a)  $9x - 25$
- b)  $9x + 25$
- c)  $9x^2 + 25$
- d)  $9x^2 - 30x + 25$
- e)  $9x^2 - 16x + 25$

11)  $1 < -2|x + 3| + 5$  Find the solutions for  $x$ .

Absolute Values and Inequalities

- a)  $-5 < x < -1$
- b)  $x < -5$  or  $x > 1$
- c)  $x > -5$  or  $x < 1$
- d)  $x > 5$
- e) no solutions

12) What is the 5th term in the arithmetic sequence?

Sequences

$$t_1 = 1 \quad t_2 = 1/2$$

- a)  $1/16$
- b)  $1/8$
- c)  $0$
- d)  $-1/2$
- e)  $-1$

13)  $(4 + 3i)(4 - 3i) =$

Complex numbers ( $a + bi$ )

- a)  $7$
- b)  $25$
- c)  $16 + 9i$
- d)  $16 - 9i$
- e)  $16 - 24i$

14)  $y = 3x + 5$       Solve.  
 $2x - 3y = -8$

Linear Systems

- a)  $(-1, 4)$
- b)  $(-1, 2)$
- c)  $(1, 8)$
- d)  $(2, 4)$
- e)  $(2, -1)$

15) The center of a circle is at the origin. If the point  $(-3, 7)$  lies on the circle, what is the length of the radius?

Distance formula  
(and Midpoint)

- a)  $4$
- b)  $10$
- c)  $\sqrt{10}$
- d)  $\sqrt{58}$
- e)  $2\sqrt{10}$

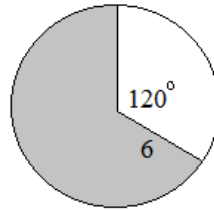
16) Which line is NOT parallel to  $y = 4x + 7$

- a)  $y = 4x - 7$
- b)  $8x - 2y = -14$
- c)  $(y - 7) = 4(x + 2)$
- d)  $4x + y = 10$
- e)  $x = \frac{y}{4}$

Slope, parallel, and perpendicular lines

17) Find the sector area of the shaded area:

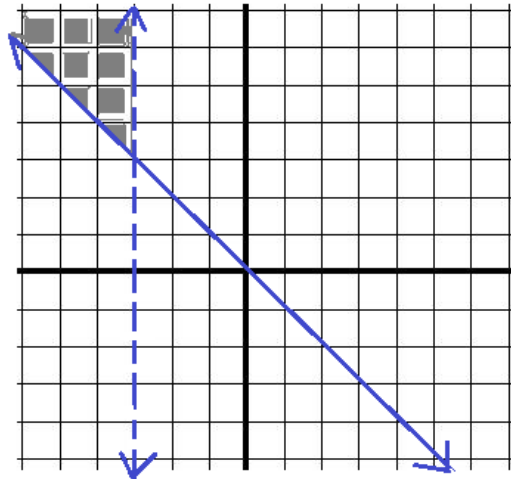
- a)  $6\pi$
- b)  $8\pi$
- c)  $12\pi$
- d)  $24\pi$
- e)  $36\pi$



Circles

18) Describe the system:

- a)  $x > -3$   
 $y \geq x$
- b)  $x < -3$   
 $y > x$
- c)  $x < -3$   
 $y \geq -x$
- d)  $x < -3$   
 $y > -x$
- e)  $x \leq -3$   
 $y < -x$



Graphing systems; inequalities

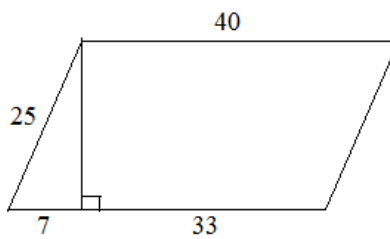
19) What is the maximum value(y) in the curve  $y = -2(x - 4)(x - 10)$

- a) 4
- b) 7
- c) 10
- d) 18
- e) 40

Parabolas and Curves

20) What is the area of the parallelogram?

- a) 130
- b) 500
- c) 960
- d) 1000
- e) 1600



Polygon area and perimeter  
and Pythagorean Theorem

21) The area of a rectangle is 40 sq feet.

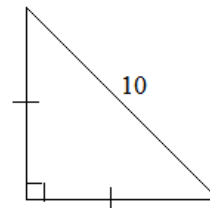
If you triple the lengths of the sides, what is the area of the new rectangle?

- a) 120
- b) 240
- c) 360
- d) 1200
- e) 1600

Areas, similarity and ratios

22) What is the perimeter of the isosceles right triangle?

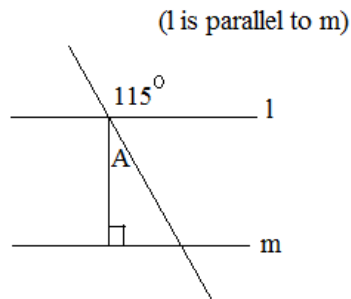
- a)  $10 + 20\sqrt{2}$
- b)  $15 + 5\sqrt{3}$
- c) 20
- d)  $10\sqrt{2}$
- e)  $10 + 10\sqrt{2}$



Right triangles

23) What is the measure of A?

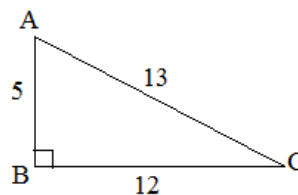
- a) 25
- b) 35
- c) 65
- d) 90
- e) 115



Relations of lines and angles

24) What is cosine of angle A?

- a)  $5/12$
- b)  $5/13$
- c)  $12/13$
- d)  $13/12$
- e) 1



Basic trigonometry

ACT topics to know

ANSWERS

1)  $3.41 \times 0.002 =$

a)  $6.82 \times 10^{-4}$

b)  $6.82 \times 10^{-3}$

c)  $6.82 \times 10^{-2}$

d)  $6.82 \times 10^2$

e)  $6.82 \times 10^3$

$2 \times 341 = 682$

Then, there are 5 total decimal places ---

$.00682 = 6.82 \times 10^{-3}$

Decimals and Scientific Notation

2)  $\sqrt[4]{200}$  is closest to which number?

a) 13

b) 13.5

c) 14

d) 14.5

e) 15

$\sqrt[4]{200} = 10 \sqrt[4]{2}$

approx.  $10 \times 1.4 = 14$

$14^2 = 196$

$15^2 = 225$

Square roots and estimation

3) Which is NOT a factor of 252?

a) 2

b) 3

c) 5

d) 6

e) 7

252 is divisible by 2, 3, 6, and 7..

Factors/GCF/LCM

4) 40 is 2% of what number?

a) 8

b) 80

c) 800

d) 2000

e) 8000

$.02x = 40$  (2% of x is 40)

$x = 2000$  (notice: 2% of 100 is 2;  
2% of 1000 is 20  
2% of 2000 is 40)

Percentages

5) A standard die has 6 sides. What is the probability of rolling a 5 and then a 6?

a)  $1/2$

b)  $1/3$

c)  $1/6$

d)  $1/18$

e)  $1/36$

$p(\text{rolling a 5}) = \frac{1}{6}$

probability =  $\frac{\# \text{ of successes}}{\# \text{ of possible}}$

$p(\text{rolling a 6}) = \frac{1}{6}$

$p(5, \text{ then } 6) = \frac{1}{36}$

probability of 2 independent events occurring is  $p(\text{first}) \times p(\text{second})$

Probability



6) What is the mean of the following set: {5, 7, -3, 0, 7, 8, -24} ?

Statistical Data

a) -2

b) 0

c) 5

d) 7

e) 29

$$\text{mean is average: } \frac{5 + 7 + -3 + 0 + 7 + 8 + -24}{7 \text{ (terms)}} = 0$$

also, the range is 32; the mode is 7; and median is 5

7)  $\frac{(x^2 yz)^3}{2} \cdot (4xy^3 z)^2$

Exponents and Order of Operations  
(PEMDAS)

a)  $2x^5 y^7 z^8$

$$\frac{x^6 y^3 z^3}{2} \cdot 16x^2 y^6 z^2$$

b)  $4x^8 y^9 z^5$

$$8x^8 y^9 z^5$$

c)  $4x^5 y^8 z^5$

d)  $8x^7 y^8 z^5$

e)  $8x^8 y^9 z^5$

8) For the equation  $y = -3x + 5$ :

Algebra and Substitution

If x is  $(2a - 3)$ , what is y?

a)  $-6a + 2$

$$y = -3(2a - 3) + 5$$

b)  $-6a + 14$

$$y = -6a + 9 + 5$$

c)  $8a$

$$y = -6a + 14$$

d)  $14a$

e)  $16a + 2$

9) Solve  $x^2 + x = 12$

Factoring Quadratics

a) 3

$$x^2 + x - 12 = 0$$

b) 4

$$(x - 3)(x + 4) = 0$$

c) 3 and -4

$$x = 3, -4$$

d) -3 and 4

e) 3 and 4

10)  $(3x - 5)^2 =$

$$(3x - 5)(3x - 5)$$

FOIL

a)  $9x - 25$

$$9x^2 - 15x - 15x + 25$$

b)  $9x + 25$

c)  $9x^2 + 25$

$$9x^2 - 30x + 25$$

d)  $9x^2 - 30x + 25$

e)  $9x^2 - 16x + 25$

11)  $1 < -2|x + 3| + 5$  Find the solutions for x.

Absolute Values and Inequalities

a)  $-5 < x < -1$

b)  $x < -5$  or  $x > 1$

c)  $x > -5$  or  $x < 1$

d)  $x > 5$

e) no solutions

$-4 < -2|x + 3|$

$2 > |x + 3|$

$x < -1$  and  $x > -5$

12) What is the 5th term in the arithmetic sequence?

Sequences

$t_1 = 1$   $t_2 = 1/2$

a)  $1/16$

b)  $1/8$

c)  $0$

d)  $-1/2$

e)  $-1$

arithmetic sequence, and the common difference is  $-1/2$ ..

$1 \quad 1/2 \quad 0 \quad -1/2 \quad -1 \quad -3/2 \quad -2 \dots$

13)  $(4 + 3i)(4 - 3i) =$

Use FOIL  $i \times i = -1$

Complex numbers ( $a + bi$ )

a)  $7$

b)  $25$

c)  $16 + 9i$

d)  $16 - 9i$

e)  $16 - 24i$

$16 - 12i + 12i - 9i^2$

$16 + 9 = 25$

14)  $y = 3x + 5$   
 $2x - 3y = -8$

Solve.

using substitution:

Linear Systems

a)  $(-1, 4)$

b)  $(-1, 2)$

c)  $(1, 8)$

d)  $(2, 4)$

e)  $(2, -1)$

$2x - 3(3x + 5) = -8$

$2x - 9x - 15 = -8$

$-7x = 7$

$x = -1$

$y = 3x + 5$

$y = 3(-1) + 5$

$y = 2$

15) The center of a circle is at the origin. If the point  $(-3, 7)$  lies on the circle, what is the length of the radius?

Distance formula  
(and Midpoint)

a)  $4$

b)  $10$

c)  $\sqrt{10}$

d)  $\sqrt{58}$

e)  $2\sqrt{10}$

radius is the distance from  $(0, 0)$  to  $(-3, 7)$

$\sqrt{(-3 - 0)^2 + (7 - 0)^2} = \sqrt{58}$

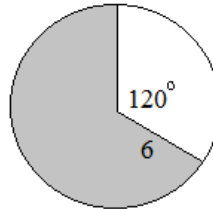
16) Which line is NOT parallel to  $y = 4x + 7$

- a)  $y = 4x - 7$     intercept form: slope is 4    parallel lines have same slope
- b)  $8x - 2y = -14$     same line
- c)  $(y - 7) = 4(x + 2)$     pt. slope form: slope is 4
- d)  $4x + y = 10$     standard form: slope is -4**
- e)  $x = \frac{y}{4}$      $y = 4x$     slope is 4

Slope, parallel, and perpendicular lines

17) Find the sector area of the shaded area:

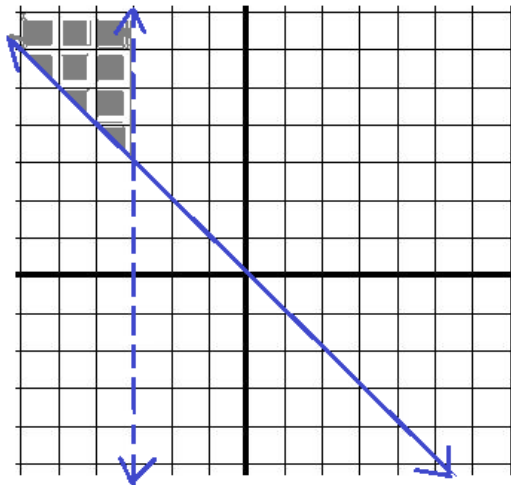
- a)  $6\pi$     area of entire circle:  $36\pi$
- b)  $8\pi$
- c)  $12\pi$
- d)  $24\pi$     shaded area is  $\frac{240}{360} = \frac{2}{3}$**
- e)  $36\pi$      $\frac{2}{3}$  of  $36\pi = 24\pi$



Circles

18) Describe the system:

- a)  $x > -3$   
 $y \geq x$
- b)  $x < -3$   
 $y > x$
- c)  $x < -3$   
 $y \geq -x$**
- d)  $x < -3$   
 $y > -x$
- e)  $x \leq -3$   
 $y < -x$



Graphing systems; inequalities

19) What is the maximum value(y) in the curve  $y = -2(x - 4)(x - 10)$

- a) 4    since (4, 0) and (10, 0) are the x-intercepts, the axis of symmetry is the midpoint:
- b) 7
- c) 10
- d) 18**     $x = 7$     and, since the vertex must lie on the axis of symmetry, the vertex is  $-2(7 - 4)(7 - 10) = 18$     the max is (7, 18)
- e) 40

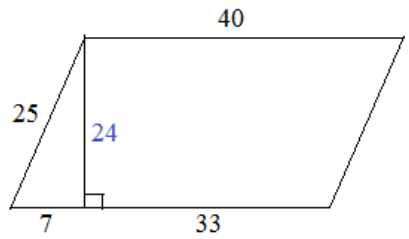
Parabolas and Curves

20) What is the area of the parallelogram?

Polygon area and perimeter and Pythagorean Theorem

- a) 130
- b) 500
- c) 960**
- d) 1000
- e) 1600

area of parallelogram:  
base x height  
 $40 \times 24 = 960$



7-24-25 right triangle

21) The area of a rectangle is 40 sq feet.  
If you triple the lengths of the sides, what is the area of the new rectangle?

Areas, similarity and ratios

- a) 120
- b) 240
- c) 360**
- d) 1200
- e) 1600

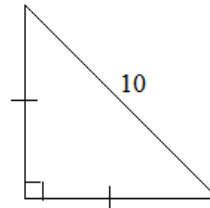
suppose the sides were 4 and 10...  
then, triple them to 12 and 30...  
area is now 360...

22) What is the perimeter of the isosceles right triangle?

Right triangles

- a)  $10 + 20\sqrt{2}$
- b)  $15 + 5\sqrt{3}$
- c) 20
- d)  $10\sqrt{2}$
- e)  $10 + 10\sqrt{2}$**

each leg is  $\frac{10}{\sqrt{2}} = \frac{10\sqrt{2}}{2} = 5\sqrt{2}$   
perimeter is  $10 + 5\sqrt{2} + 5\sqrt{2}$



45-45-90 right triangle  
 $x - x - \sqrt{2}x$

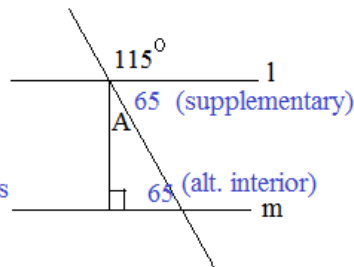
23) What is the measure of A?

(l is parallel to m)

Relations of lines and angles

- a) 25**
- b) 35
- c) 65
- d) 90
- e) 115

$A = 25$   
(complementary)  
or  
(sum of int. angles of triangle is 180)

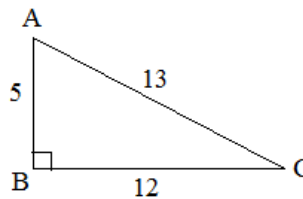


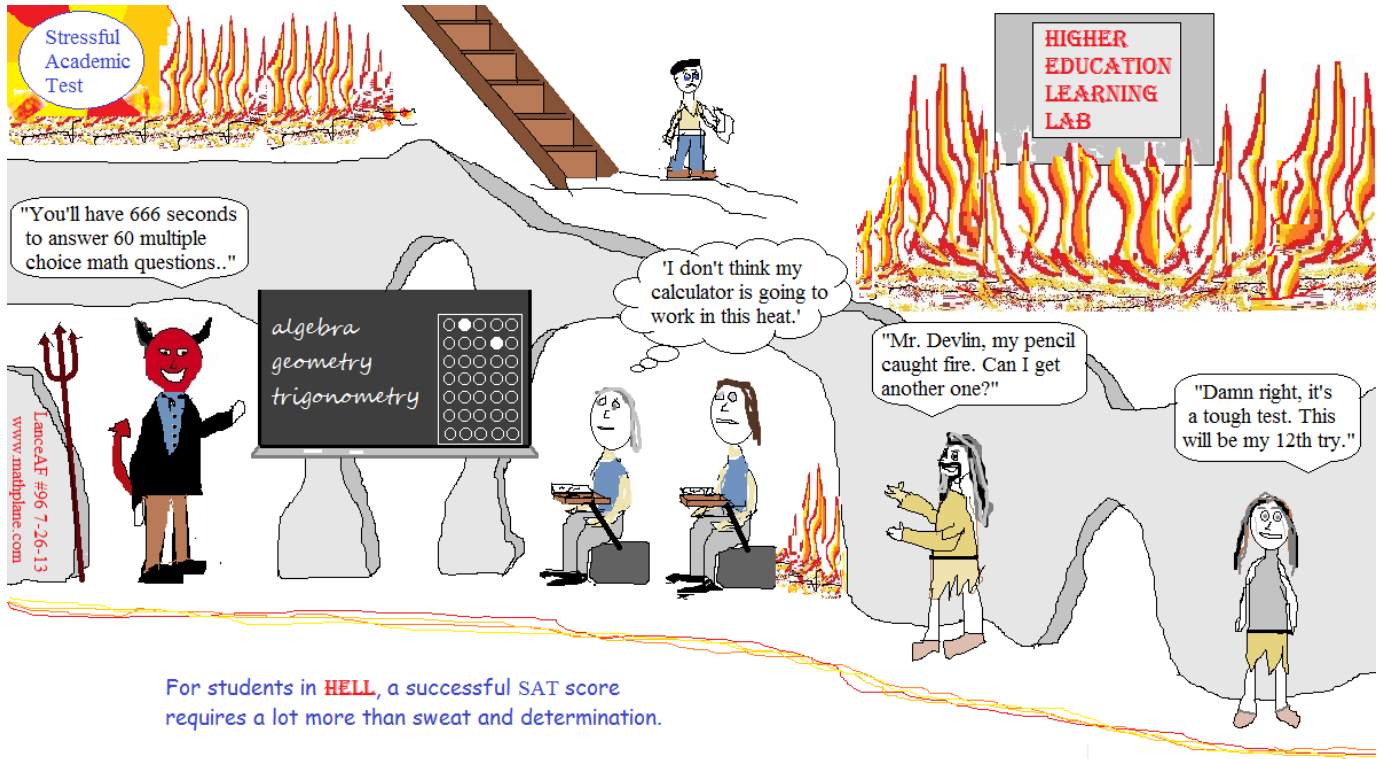
24) What is cosine of angle A?

Basic trigonometry

- a) 5/12
- b) 5/13**
- c) 12/13
- d) 13/12
- e) 1

$\cos = \frac{\text{adjacent}}{\text{hypotenuse}}$   
 $= \frac{5}{13}$





# SAT Topics to Know...

SAT Topics to Know
--------------------

1) Which of the following is NOT true:

Classifying Numbers

- a) The set of integers is larger than the set of natural numbers
- b) All integers are real numbers
- c)  $\sqrt[3]{3}$  is irrational
- d) A repeating decimal, such as .292929... is irrational
- e) There are an infinite number of rational numbers between 10 and 20

2)  $3 \cdot 4^2 - \frac{(9-3)}{2} \cdot 4 =$

PEMDAS/Order of Operations

- a) 12
- b) 36
- c) 156
- d) 164
- e) 180

3) How many prime factors of 60 are there?

Prime factorization

- a) 1
- b) 2
- c) 3
- d) 4
- e) 5

4) Find the greatest common factor and least common multiple of 10 and 25.

GCF and LCM

- a) LCM: 10 GCF: 25
- b) LCM: 50 GCF: 5
- c) LCM: 250 GCF: 50
- d) LCM: 1 GCF: 250
- e) LCM: 10 GCF: 5

5) What is the next term in this *geometric* sequence:  $1/2, 1/4$  ?

Sequences

- a)  $1/6$
- b)  $1/8$
- c) 0
- d)  $1/16$
- e) 4

6) What percent of 20 is 15?

Percentages

- a) 3
- b) 30
- c) 75
- d) 133
- e) 300

7) What is the median of set A?  $A = \{5, 0, -7, 8, -3, 8, 3\}$

Mean, Median, Mode, and Range

- a) 5
- b) -7
- c) 8
- d) 3
- e) 2

8) A bag contains 20 marbles: 4 blue, 7 white, and 9 red.

Probability

What is the probability of picking 2 white marbles (without replacement)?

- a)  $13/20$
- b)  $21/190$
- c)  $49/400$
- d)  $21/200$
- e)  $9/19$

9) A diner serves lunch with the following number of choices:

3 beverages  
4 entrees  
5 sides

How many different meals could you order  
having 1 beverage, 1 entree, and 2 different sides?

Counting Principles  
(combinations/permutations)

- a) 12
- b) 16
- c) 60
- d) 120
- e) 300

10)  $(3x^2y^3)^2 =$

Exponents

- a)  $3x^4y^5$
- b)  $3x^4y^6$
- c)  $9x^4y^5$
- d)  $9x^4y^6$
- e)  $9xy^{10}$

11)  $(x + 1)$  is a factor of  $2x^2 - 8x - 10$ . What is the other binomial factor? Factoring

- a) 2
- b)  $2x - 5$
- c)  $x + 10$
- d)  $x - 5$
- e)  $2x - 8$

12)  $(2x - 7)^2 =$  FOIL

- a)  $4x + 49$
- b)  $4x^2 + 49$
- c)  $4x^2 + 14x + 49$
- d)  $4x^2 - 28x + 49$
- e)  $4x^2 - 49$

13)  $f(x) = 2x - 7$     $g(x) = x^2$  Function notation

$$f(g(-3)) =$$

- a) -26
- b) -19
- c) -13
- d) 11
- e) 139

14)  $y = 3|x - 5| + 2$  Absolute Value

If the output  $y = 8$ , then what is  $x$  ?

- a) 7
- b) 11
- c) 3, 7
- d) 18
- e) 8

15) What is the y-intercept for the parabola  $y = (x - 6)^2 + 3$  ? Parabolas

- a) (0, -6)
- b) (0, 3)
- c) (0, 6)
- d) (0, 36)
- e) (0, 39)



16) What is the slope of a line parallel to  $2x + 3y = 12$  ?

Linear equations

- a) 2
- b) -2
- c)  $-2/3$
- d)  $3/2$
- e) 4

17) A circle's diameter has endpoints at (3, 4) and (8, -1). What is the length of the diameter?

Distance formula

- a) 10
- b)  $5\sqrt{2}$
- c) 8
- d)  $\sqrt{34}$
- e) 5

18) The midpoint (M) of line segment  $\overline{AB}$  is (1, 6).  
If point A is (-3, 14), what is the coordinate of point B?

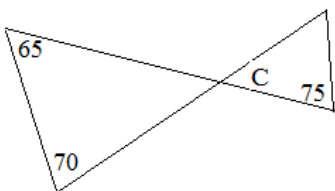
Midpoint formula

- a) (-1, 10)
- b) (5, -2)
- c) (-7, 22)
- d) (-2, 20)
- e) (3, 7)

19) What is the measure of angle C ?

Triangles and Intersecting lines

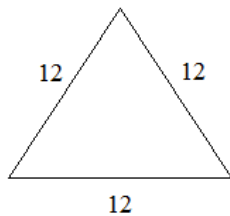
- a) 45
- b) 65
- c) 75
- d) 135
- e) 140



20) What is the altitude (height) of the equilateral triangle?

Triangles, Pythagorean Theorem,  
and special right triangles

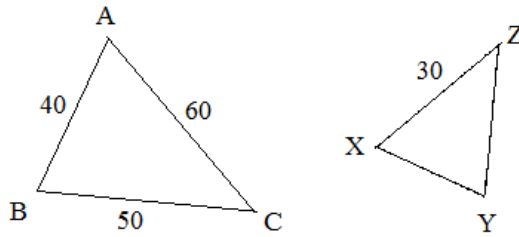
- a) 12
- b) 15
- c) 6
- d)  $6\sqrt{3}$
- e)  $12\sqrt{2}$



21)  $\triangle ABC \approx \triangle XYZ$

What is measure of  $\overline{YZ}$  ?

- a) 20
- b) 25
- c) 35
- d) 45
- e) 80

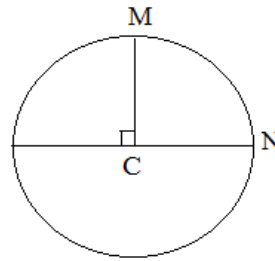


Ratios and Similarity

22) What is the arc length of  $\widehat{MN}$  ?

$$\overline{MC} = 6$$

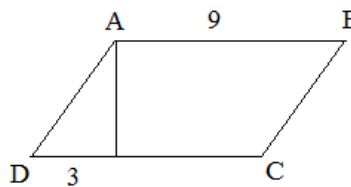
- a)  $3\pi$
- b)  $6\pi$
- c)  $9\pi$
- d)  $12\pi$
- e)  $36\pi$



Circles, Arc Length, and Sector Area

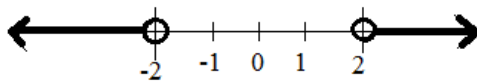
23) If the perimeter of ABCD is 28, what is the area?

- a) 20
- b) 27
- c) 36
- d) 45
- e) 63



Polygons: perimeter and area

24) Describe the number line inequality:



Inequalities

- a)  $x > 2$  and  $x < -2$
- b)  $x > 2$  or  $x < -2$
- c)  $x \geq 2$  and  $x \leq -2$
- d)  $x \geq 2$  or  $x \leq -2$
- e)  $-2 < x < 2$

- A) A veterinarian uses the following model to estimate a gorilla's weight:  $w = 12 + 8m$  where  $w$  is the weight in pounds and  $m$  is the number of months from birth to 5 years old. Based on the model, what is the average weight gain, in pounds, for the gorilla's 4th year?

Understanding Models

- a) 8
- b) 12
- c) 32
- d) 48
- e) 96

- B) The data in the table was produced by an exercise scientist, showing the number of trips to the gym each week. Group X were 100 people who worked evenings, and Group Y consisted of 100 people who worked during the day.

Utilizing Tables

	None	1 - 4	5 - 7	Total
Group X	15	29	56	100
Group Y	8	37	55	100
Total	23	66	111	200

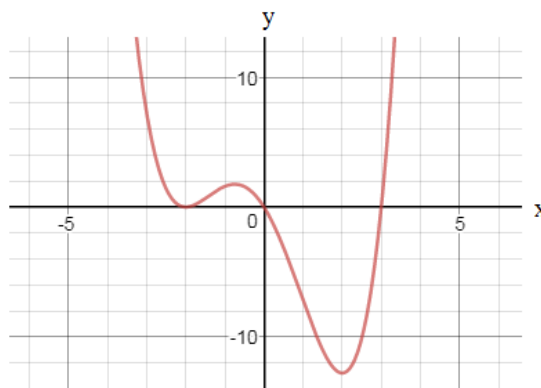
If a person from Group X is chosen at random, what is the probability they work out at least once per week?

- a) 15/100
- b) 29/100
- c) 85/100
- d) 66/200
- e) 177/200

- C) Which of the following could be the equation of the graph?

Describing Graphs

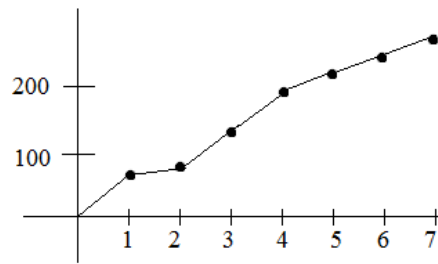
- a)  $y = x(x - 2)(x + 3)$
- b)  $y = x(x + 2)(x - 3)$
- c)  $y = x(x - 2)^2(x + 3)$
- d)  $y = x(x + 2)^2(x - 3)$



- D) The following is a graph showing the population of a town (in thousands of people), during the first 7 years of the millenium. Which interval has the slowest increase in population?

Interpreting Graphs

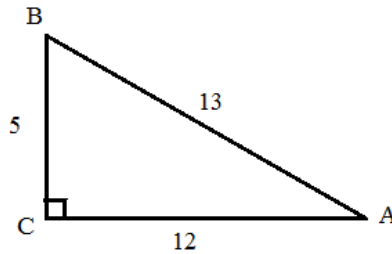
- a) 1 - 2
- b) 2 - 3
- c) 3 - 4
- d) 4 - 5
- e) 5 - 6



- E) In the triangle, which value is equal to  $\sin A$ ?

Trigonometry

- a)  $5/12$
- b)  $12/5$
- c)  $12/13$
- d)  $\cos B$
- e)  $\tan C$



- F)  $M = 8000(1.02)^t$

Exponential Equations

The equation above models the number of subscribers to a new cable company, where  $t$  is the number of months and  $M$  is the membership total.

When would you expect the number of initial subscribers to double?

- a) 2 months
- b) 8 months
- c) 10 months
- d) 36 months
- e) 50 months

1) Which of the following is NOT true:

- a) The set of integers is larger than the set of natural numbers
- b) All integers are real numbers
- c)  $\sqrt[3]{3}$  is irrational
- d) A repeating decimal, such as .292929... is irrational**
- e) There are an infinite number of rational numbers between 10 and 20

Classifying Numbers

$$.2929... = \frac{29}{99}$$

any number that can be expressed as a fraction is *rational*

2)  $3 \cdot 4^2 - \frac{(9-3)}{2} \cdot 4 =$   $3 \cdot 16 - \frac{6}{2} \cdot 4$

- a) 12
- b) 36**
- c) 156
- d) 164
- e) 180

$48 - 3 \cdot 4$

$48 - 12 = 36$

PEMDAS/Order of Operations

order of operations: parentheses  
exponents  
multiplication/  
division  
addition/  
subtraction

3) How many prime factors of 60 are there?

- a) 1
- b) 2
- c) 3**
- d) 4
- e) 5

factors of 60: 1 and 60  
2 and 30  
3 and 20  
4 and 15  
5 and 12  
6 and 10

of those, 2, 3, and 5 are prime..

Prime factorization

4) Find the greatest common factor and least common multiple of 10 and 25.

GCF and LCM

- a) LCM: 10 GCF: 25
- b) LCM: 50 GCF: 5**
- c) LCM: 250 GCF: 50
- d) LCM: 1 GCF: 250
- e) LCM: 10 GCF: 5

Factors:

10: 1, 2, 5, 10  
25: 1, 5, 25

common factors are 1 and 5

GCF: 5

Multiples:

10: 10, 20, 30, 40, 50, 60, ...  
25: 25, 50, 75, 100, ...

common multiples include 50, 100, 150

LCM: 50

5) What is the next term in this *geometric* sequence: 1/2, 1/4 ?

Sequences

- a) 1/6
- b) 1/8**
- c) 0
- d) 1/16
- e) 4

The common ratio of the sequence is 1/2.. So, the next term is  $1/4 \cdot 1/2 = 1/8$

geometric sequence: 1/2, 1/4, 1/8, 1/16...

arithmetic sequence would be adding -1/4...  
1/2, 1/4, 0, -1/4, -1/2, -3/4, ...

6) What percent of 20 is 15?

Percentages

- a) 3
- b) 30
- c) 75**
- d) 133
- e) 300

$$\frac{X}{100} = \frac{15}{20}$$

$$\frac{X}{100} = \frac{3}{4} \quad X = 75$$

7) What is the median of set A?  $A = \{5, 0, -7, 8, -3, 8, 3\}$

Mean, Median, Mode, and Range

- a) 5
- b) -7
- c) 8
- d) 3**
- e) 2

median is the middle value:

set A is order: -7, -3, 0, 3, 5, 8, 8

the middle term is 3

mean is the 'average' =  $\frac{\text{total of set}}{\# \text{ of items}} = \frac{14}{7} = 2$

mode is 'most often' = 8

range is amount between high and low: -7 to 8 is 15

8) A bag contains 20 marbles: 4 blue, 7 white, and 9 red.

Probability

What is the probability of picking 2 white marbles (without replacement)?

- a) 13/20
- b) 21/190**
- c) 49/400
- d) 21/200
- e) 9/19

$$p(\text{drawing first white marble}) = \frac{7}{20}$$

$$p(\text{drawing second white marble} | \text{the first was white}) = \frac{6}{19}$$

$$\frac{7}{20} \cdot \frac{6}{19} = \frac{21}{190}$$

9) A diner serves lunch with the following number of choices:

Counting Principles  
(combinations/permutations)

- 3 beverages
- 4 entrees
- 5 sides

How many different meals could you order  
having 1 beverage, 1 entree, and 2 different sides?

$$240/2 = 120$$

- a) 12
- b) 16
- c) 60
- d) 120**
- e) 300

1 beverage: 3 choices

1 entree: 4 choices

first side: 5 choices

second side: 4 remaining choices

number of choices:  $3 \times 4 \times 5 \times 4 = 240$

\*\*Then, since first side A and second side B  
is the same as first side B and second side A,  
we must eliminate the "double counts"

10)  $(3x^2y^3)^2 =$

Exponents

- a)  $3x^4y^5$
- b)  $3x^4y^6$
- c)  $9x^4y^5$
- d)  $9x^4y^6$**
- e)  $9xy^{10}$

$$3x^2y^3 \cdot 3x^2y^3 = 9x^4y^6$$



16) What is the slope of a line parallel to  $2x + 3y = 12$  ?

Linear equations

- a) 2
- b) -2
- c)  $-2/3$
- d)  $3/2$
- e) 4

(parallel lines have the same slope;  
perpendicular lines have slopes with  
opposite reciprocals)

$$\begin{aligned} 2x + 3y &= 12 \\ 3y &= -2x + 12 \\ y &= \frac{-2x}{3} + 4 \end{aligned}$$

17) A circle's diameter has endpoints at (3, 4) and (8, -1). What is the length of the diameter?

Distance formula

- a) 10
- b)  $5\sqrt{2}$
- c) 8
- d)  $\sqrt{34}$
- e) 5

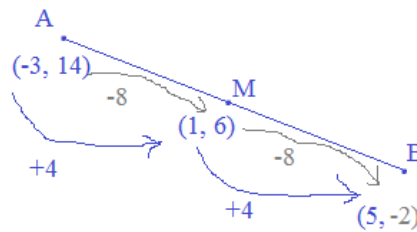
distance formula:  $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

$$\sqrt{(3 - 8)^2 + (4 - (-1))^2} = \sqrt{25 + 25} = 5\sqrt{2}$$

18) The midpoint (M) of line segment  $\overline{AB}$  is (1, 6).  
If point A is (-3, 14), what is the coordinate of point B?

Midpoint formula

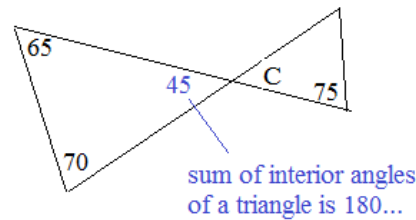
- a) (-1, 10)
- b) (5, -2)
- c) (-7, 22)
- d) (-2, 20)
- e) (3, 7)



19) What is the measure of angle C ?

Triangles and Intersecting lines

- a) 45
- b) 65
- c) 75
- d) 135
- e) 140



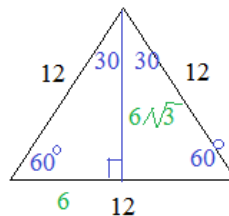
then, C is 45  
(vertical angles  
are congruent)

20) What is the altitude (height) of the equilateral triangle?

Triangles, Pythagorean Theorem,  
and special right triangles

- a) 12
- b) 15
- c) 6
- d)  $6\sqrt{3}$
- e)  $12\sqrt{2}$

30-60-90  
right triangle:

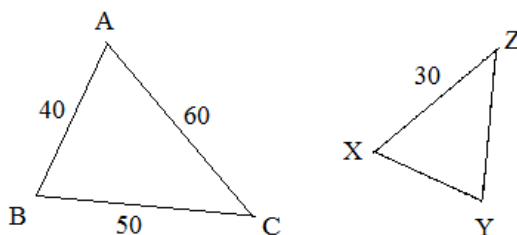




21)  $\triangle ABC \sim \triangle XYZ$

What is measure of  $\overline{YZ}$  ?

- a) 20
- b) 25**
- c) 35
- d) 45
- e) 80



Ratios and Similarity

$$\text{ratio: } \frac{AC}{XZ} = \frac{60}{30} = \frac{2}{1}$$

$$\text{so, } \frac{BC}{YZ} = \frac{2}{1} \quad YZ = 25$$

22) What is the arc length of  $\widehat{MN}$  ?

$$\overline{MC} = 6$$

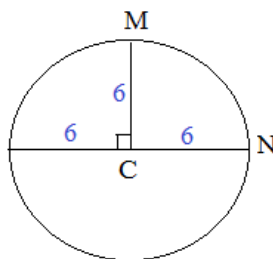
- a)  $3\pi$**
- b)  $6\pi$
- c)  $9\pi$
- d)  $12\pi$
- e)  $36\pi$

circumference of circle:

$$\pi(\text{diameter}) = 12\pi$$

Since  $MN$  is  $1/4$  of the entire circle, the arc length is  $1/4$  of the circumference:

$$3\pi$$



Circles, Arc Length, and Sector Area

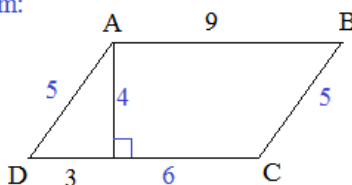
23) If the perimeter of ABCD is 28, what is the area?

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- b) 27
- c) 36**
- d) 45
- e) 63

Area of parallelogram:

$$(\text{base})(\text{height}) =$$

$$9 \times 4 = 36$$



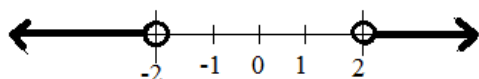
Polygons: perimeter and area

$$\overline{AB} = \overline{DC} \text{ so, } \overline{DC} = 9$$

Since the perimeter is 28, and the horizontal sides add to 18, then, the vertical sides are each 5

Then, recognizing the 3-4-5 right triangle, gets the height..

24) Describe the number line inequality:



- a)  $x > 2$  and  $x < -2$
- b)  $x > 2$  or  $x < -2$**
- c)  $x \geq 2$  and  $x \leq -2$
- d)  $x \geq 2$  or  $x \leq -2$
- e)  $-2 < x < 2$

If the circles were "closed", the inequalities would be  $\leq$  and  $\geq$

If the region *between* the points were shaded, the inequality would be "AND"

Inequalities

- A) A veterinarian uses the following model to estimate a gorilla's weight:  $w = 12 + 8m$  where  $w$  is the weight in pounds and  $m$  is the number of months from birth to 5 years old. Based on the model, what is the average weight gain, in pounds, for the gorilla's 4th year?

Understanding Models

- a) 8  
 b) 12  
 c) 32  
 d) 48  
 e) 96
- This is a linear model, where the rate of change is 8 pounds/month.... Therefore, the increase is 96 pounds per year

- B) The data in the table was produced by an exercise scientist, showing the number of trips to the gym each week. Group X were 100 people who worked evenings, and Group Y consisted of 100 people who worked during the day. If a person from Group X is chosen at random, what is the probability they work out at least once per week?

Utilizing Tables

	None	1 - 4	5 - 7	Total
Group X	15	29	56	100
Group Y	8	37	55	100
Total	23	66	111	200

- a) 15/100  
 b) 29/100  
 c) 85/100  
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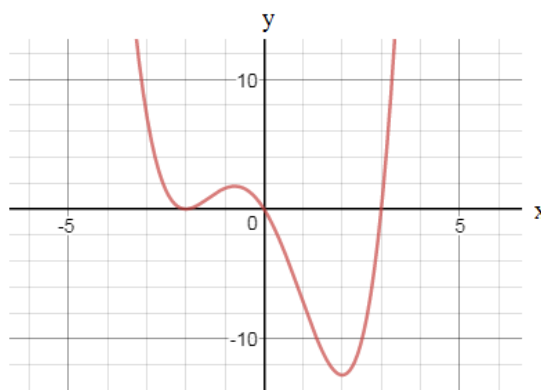
In Group X

$$\text{probability} = \frac{\text{work out AT LEAST once}}{\text{Total from group X}} = \frac{29 + 56}{100} = 85/100$$

- C) Which of the following could be the equation of the graph?

Describing Graphs

- a)  $y = x(x - 2)(x + 3)$   
 b)  $y = x(x + 2)(x - 3)$   
 c)  $y = x(x - 2)^2(x + 3)$   
 d)  $y = x(x + 2)^2(x - 3)$



The zeros are at -2, 0 and 3  
 and, at  $x = -2$ , there is a "bounce"  
 (multiplicity)

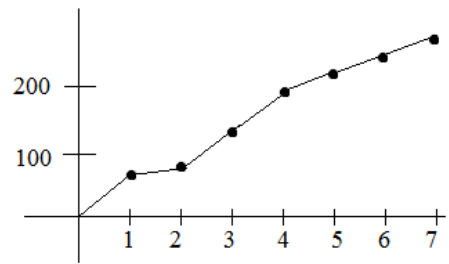
$$y = (x - -2)^2(x - 0)(x - 3)$$

D) The following is a graph showing the population of a town (in thousands of people), during the first 7 years of the millenium. Which interval has the slowest increase in population?

Interpreting Graphs

- a) 1 - 2
- b) 2 - 3
- c) 3 - 4
- d) 4 - 5
- e) 5 - 6

The slowest increase would be the lowest slope... this occurs between 1 and 2



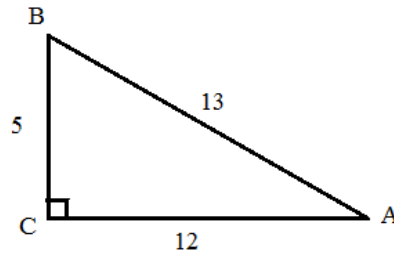
E) In the triangle, which value is equal to sinA?

Trigonometry

- a) 5/12
- b) 12/5
- c) 12/13
- d) cosB
- e) tanC

$$\sin A = \frac{5}{13}$$

$$\cos B = \frac{5}{13}$$



F)  $M = 8000(1.02)^t$

Exponential Equations

The equation above models the number of subscribers to a new cable company, where  $t$  is the number of months and  $M$  is the membership total.

When would you expect the number of initial subscribers to double?

- a) 2 months
- b) 8 months
- c) 10 months
- d) 35 months
- e) 50 months

Initial subscribers occur when  $t = 0$

So, initial subscribers = 8000

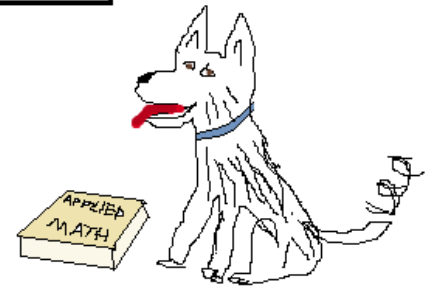
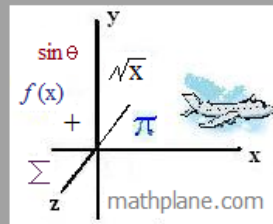
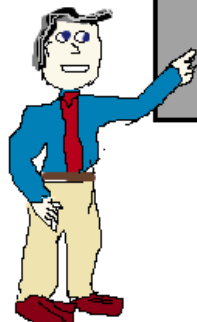
When will  $M = 16000$ ? if  $t$  is approx. 35..

Thanks for checking out this introductory packet of ACT and SAT questions. Hopefully it helped!

If you have questions, suggestions, or feedback, let us know!

Cheers,  
Lance

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And, visit our stores at [TeachersPayTeachers.com](http://TeachersPayTeachers.com) and [TES.com](http://TES.com)

*Looking for more SAT and ACT questions (with solutions)?*

1) When  $x = 4$  and  $y = -3$ , the value of  $2x^2 - 2y$  is

- a) 10
- b) 22
- c) 26
- d) 38
- e) 54

2) A car gets 30 miles per gallon. How much will it cost to drive 300 miles?

- a) \$177
- b) \$269
- c) \$299
- d) \$508
- e) \$538

3) Find the greatest common factor of 36, 84, and 132.

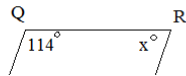
- a) 2
- b) 4
- c) 6
- d) 10
- e) 12

4) The length of a rectangle is 3 more than twice the width. Which gives the perimeter ( $p$ ) of the rectangle in terms of the width ( $w$ )?

- a)  $p = w(2w + 3)$
- b)  $p = w(2w - 3)$
- c)  $p = 3w + 3$
- d)  $p = 3w - 3$
- e)  $p = 2(3w + 3)$

5) For quadrilateral PQRS, sides PQ and RS are parallel for what value of  $x$ ?

- a) 66
- b) 72
- c) 76



200 SAT/ACT  
Math  
Practice Questions  
(and, Solutions)

by Lance Friedman

*\*\*Additional math topics... and, more challenging...*

*Available at [Mathplane.com](http://Mathplane.com) Travel Log*

*(Thanks for the support! Proceeds go to site maintenance and treats for my dog!)*

- 1) In a geometric sequence, the 2nd term is 12 and the 4th term is 3.  
The seventh term is

- a)  $-13/2$
- b)  $-6$
- c)  $3/8$
- d)  $1/2$
- e)  $3/4$

- 2) A car gets 30 miles per gallon. How much will it cost to travel 1000 miles?

- a) \$177
- b) \$269
- c) \$299
- d) \$508
- e) \$538

- 3) How many different 4-person committees can be selected from a 10-member club?

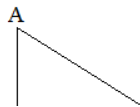
- a) 40
- b) 210
- c) 400
- d) 1260
- e) 5040

- 4) The length of a rectangle is 3 more than twice the width. Which gives the perimeter ( $p$ ) of the rectangle in terms of the width ( $w$ )?

- a)  $p = w(2w + 3)$
- b)  $p = w(2w - 3)$
- c)  $p = 3w + 3$
- d)  $p = 3w - 3$
- e)  $p = 2(3w + 3)$

- 5) If the tangent of angle A is  $1/3$ , what is the length of the hypotenuse?

- a) 2
- b)  $2\sqrt{10}$
- c) 8



# 200 (MORE) SAT/ACT Math Practice Questions (and, Solutions)

by Lance Friedman

*Good Luck on the TEST!!!*