TASC Math – Practice Readiness Test (M)

Part I – Calculator Use Allowed

1) Given the equation:

$$\sqrt{2x - 20} = 10$$

What is the value of x that will make the equation true?

A. 2

B. 10

C. 20

D. 60

$$\sqrt{2x-20} = 10$$

$$\left(\sqrt{2x-20}\right)^2 = (10)^2 \quad \text{square both sides}$$

$$2x - 20 = 100$$
$$+20 \quad +20$$
$$\overline{2x = 120} \quad \boxed{x = 60}$$

2) Which of the following is equivalent to the equation $x^2 - 16x + 64 = 0$?

A. $(x - 8)^2 = 0$

B. $(x + 8)^2 = 0$

C. $(x - 8)(x + 8) = 0$

D. $(x - 16)(x - 4) = 0$

$$(x-8)^2 \rightarrow (x-8)(x-8) = 0$$

$$x^2 - 8x$$
$$\quad -8x +64$$
$$\overline{x^2 - 16x + 64 = 0}$$

3) Which expression below is equivalent to $(\sqrt[3]{x^5})(\sqrt[6]{x^4})$?

A. $x^{\frac{21}{10}}$

B. $x^{\frac{2}{3}}$

C. $x^{\frac{3}{2}}$

D. $x^{\frac{7}{3}}$

$$(\sqrt[3]{x^5})(\sqrt[6]{x^4}) = \left(x^{\frac{5}{3}}\right)\left(x^{\frac{4}{6}}\right)$$

Rational Exponents

$$\sqrt[n]{b^m} = b^{\frac{m}{n}}$$

$$a^n \times a^h = a^{n+h}$$

4) Given the function $f(x) = x^4 + 2x^3 - 5$, the value of $f(-3)$ would be:

A. -113

B. -68

C. 68

D. 22

$$f(-3) = (-3^4) + 2(-3^3) - 5$$
$$81 + (-54) - 5$$
$$81 - 54 - 5 = 22$$
$$\boxed{22}$$

System of Equations

5) What is the solution to the system of equations below?

$x - 2y = 10$
$3x + 4y = -40$

A. $x = 4, y = -7$
B. $x = -4, y = -7$
C. $x = 4, y = 7$
D. $x = -4, y = 7$

Use substition

$x - 2y = 10$
$+ 2y \quad +2y$
$x = 2y + 10$

$3x + 4y = -40$
$3(2y + 10) + 4y = -40$
$6y + 30 + 4y = -40$
$10y + 30 = -40$
$\quad -30 \quad -30$
$\dfrac{10y = -70}{10}$
$\boxed{y = -7}$

$x - 2y = 10$
$x - 2(-7) = 10$
$x + 14 = 10$
$\quad -14 \quad -14$
$\boxed{x = -4}$

when $y = -7$, $x = -4$

6) For what value of x is $f(x) = \frac{x+2}{x-9}$ undefined?

A. 2
B. -2
C. -9
D. 9

A rational expression is undefined when the denominator is zero.

When $x = 9$, the expression is undefined! (or restricted)

$\dfrac{x+2}{x-9} \rightarrow \dfrac{x+2}{9-9} \rightarrow \dfrac{x+2}{0} \Leftarrow$ undefined

7) Solve for x: $\log_3 81 = x$

A. 3
B. 4
C. 5
D. 6

Logarithm

$3^x = 81$
$3^4 = 3 \cdot 3 \cdot 3 \cdot 3$
$3^4 = 81$

8) The population of a group of rabbits can be modeled by the function $R(t) = 1.12^t$, where $R(t)$ is the population and t is the time in weeks.

What is the percent change in the population from one week to the next, and does this represent exponential growth or decay?

A. 12%; exponential decay
B. 12%; exponential growth
C. 112%; exponential decay
D. 112%; exponential growth

Exponential Growth

$y = a(1+r)^x$

$.12 \rightarrow 12\%$ growth

a = starting value
r = growth rate, as a decimal
x = time (period of time)

9) Fred, F, can do 24 more pushups than Tye, T. Together they did a total of 73 pushups. Which system of equations can be used to find how many pushups they each did?

A. $F + 24 = T$
   $F + T = 73$

B. $T + 24 = F$
   $F + T = 73$

C. $F + 24 = T$
   $F - T = 73$

D. $T + 24 = F$
   $F - T = 73$

Systems of Equations solved algebraically

Tye $= T$
Fred $= T + 24$
Total $= 73$
$(T + F) = 73$

10) In Brooklyn 2.5 million people live in 97 square miles. What is the approximate population density per square mile of Brooklyn?

$$\text{Population Density} = \frac{\text{Total Population}}{\text{Total Area}}$$

A. 26 people per square mile

B. 243 people per square mile

C. 26,000 people per square mile

D. 39,000 people per square mile

$$2.5 \text{ million} = \frac{2,500,000}{97} = 25,773.19588 \approx 26,000 \text{ people}$$

11) The longest side of a right triangle is 34 inches. One of the legs of the right triangle measures 30 inches. What it the length of the other leg?

Pythagorean Theorem

A. 16 in.

B. 64 in.

C. 4 in.

D. 15 in.
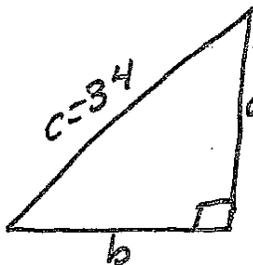
$$a^2 + b^2 = c^2$$
$$a = 30 \quad (30)^2 + b^2 = (34)^2$$
$$900 + b^2 = 1156$$
$$-900 \qquad -900$$
$$b^2 = 256$$

$$\sqrt{b^2} = \sqrt{256}$$
$$\boxed{b = 16}$$

12) Find the perimeter of $\triangle ABC$.
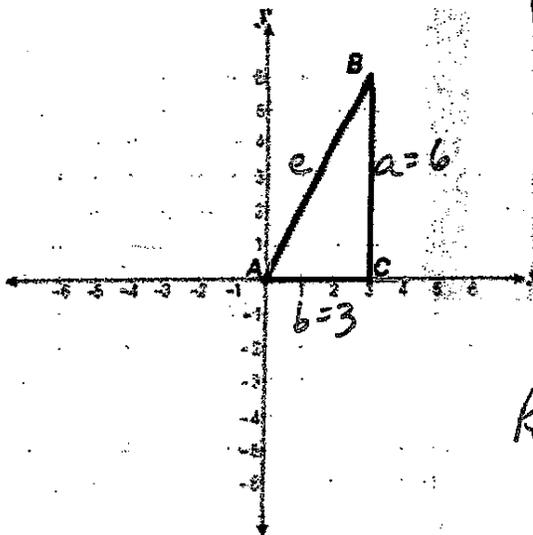
Pythagorean Theorem
$$a^2 + b^2 = c^2$$
$$6^2 + 3^2 = c^2$$
$$36 + 9 = c^2$$
$$45 = c^2$$
$$\sqrt{45} = \sqrt{c^2}$$
$$\sqrt{45} = c$$

Perimeter of a Triangle
→ add up all sides

$$\sqrt{45} + 6 + 3 = \boxed{9 + \sqrt{45}}$$

A. 15

B. $\sqrt{45}$

C. $15 + \sqrt{45}$

D. $9 + \sqrt{45}$

13) Find the volume of the figure below.

A. 36 cm^3

B. $\frac{16}{3} \text{ cm}^3$

C. 48 cm^3 ⟨circled⟩

D. 144 cm^3

[handwritten on figure] $h = 9 \text{ cm}$ $l = 4 \text{ cm}$ $l = 4 \text{ cm}$

[handwritten work]

Volume of a Pyramid

$V = \frac{1}{3} B h$

$B = \text{area of the base}$

Base $= 4 \times 4 = 16 \text{ sq. cm.}$

Height $= 9 \text{ cm}$

$V = \frac{1}{3} B h$

$= \frac{1}{3} (16)(9)$

$V = 48 \text{ cm}^3$
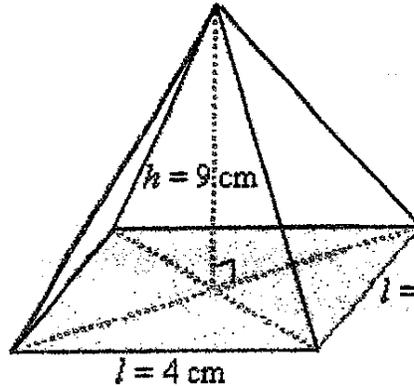
14)

Method of Transport to School

[handwritten]
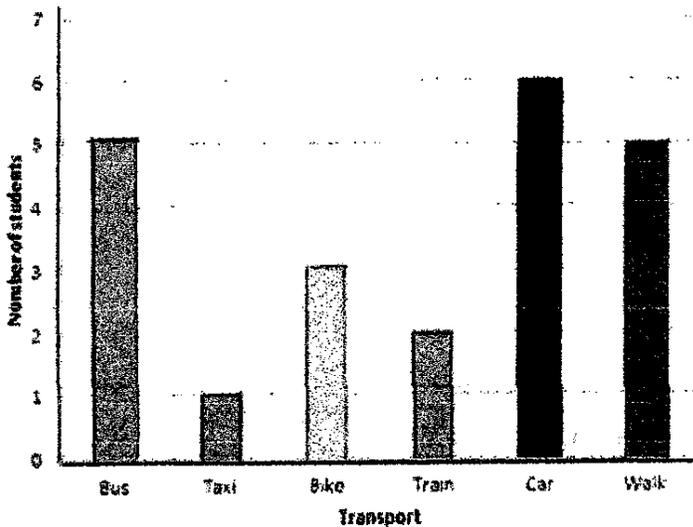
Bus – 5
Taxi – 1
Bike – 3
Train – 2
Car – 6
Walk – 5
———
Total 22

The bar graph shows the usual method of transport to school for the students in a class.

What is the relative frequency for traveling to school by car?

A. $0.\overline{27}$ ⟨circled⟩

B. 0.375

C. 0.6

D. 6

[handwritten work]

Relative Frequency $= \dfrac{\# \text{ of times an event occurs}}{\text{total} \# \text{ of outcomes}}$

$\dfrac{car}{total} \rightarrow \dfrac{6}{22} = 0.\overline{27}$

15) Which names the function for the arithmetic sequence below?

$20, 17, 14, 11, 8, 5, 2, \ldots$ *common difference $= -3$ Arithmetic Sequence*

- A. $f(n) = 14 - n$
- **B.** $f(n) = 14 - 3n$
- C. $f(n) = 3 - 14n$
- D. $f(n) = -3 + 14n$

16) A circle has a radius of 4 cm. Find the length of an arc subtended by a central angle of 150°.

Central Angle is an angle formed by 2 intersecting radii such that its vertex is at the center of the circle.

- A. 600π
- **B.** $\dfrac{10\pi}{3}$
- C. $\dfrac{150\pi}{4}$
- D. $\dfrac{5\pi}{3}$
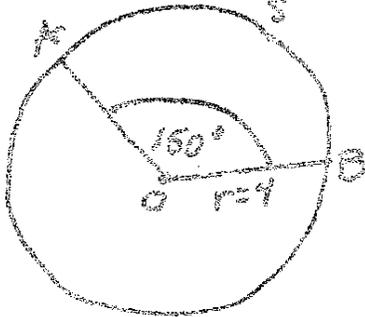
$\angle AOB =$ central $\angle$
$\angle AB =$ intercepted arc
Arc length $= S$

$S = \theta \cdot \dfrac{\pi}{180} \cdot r$

$150° \cdot \dfrac{\pi}{180} \cdot 4$

$\dfrac{600\pi}{180} = \dfrac{60\pi}{18} = \boxed{\dfrac{10\pi}{3}}$

17) $\text{Density} = \dfrac{\text{mass}}{\text{volume}}$. Steel has a density of about 7.75 grams per cubic centimeter. To the nearest gram, what is the mass of a cube of steel that measures 24 centimeters by 24 centimeters by 24 centimeters?

- A. 3
- B. 186
- C. 1,784
- **D.** 107,136

Density $= \dfrac{mass}{volume}$

$D = \dfrac{m}{V}$

$7.75 = \dfrac{m}{24^3}$

$7.75 = \dfrac{m}{13824}$

$13824 \times 7.75 = m$

$\boxed{m = 107,136}$

18) Solve for x: $2x^2 - 3x = 2$

Quadratic Formula $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

- **A.** $x = \{-0.5, 2\}$
- B. $x = \{-0.5, -2\}$
- C. $x = \{0.5, -2\}$
- D. $x = \{2.5, 2\}$

$2x^2 - 3x = 2$
$2x^2 - 3x - 2 = 0$
$a = 2, b = -3, c = -2$
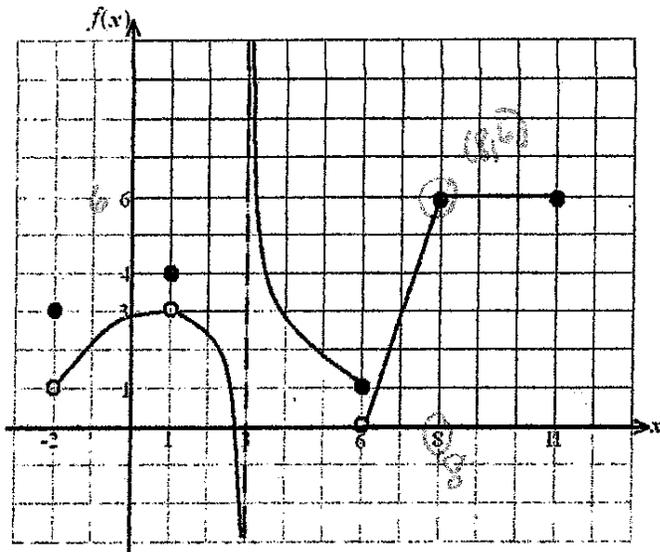
$\dfrac{-(-3) \pm \sqrt{-3^2 - 4(2)(-2)}}{2(2)}$

Roots or Zeros $= (-0.5, 2)$

$\dfrac{3 \pm \sqrt{9 + 16}}{4}$

$\dfrac{3 \pm \sqrt{25}}{4} \rightarrow \dfrac{3 \pm 5}{4} \rightarrow \dfrac{3+5}{4} = \dfrac{8}{4} = 2 \quad \dfrac{3-5}{4} = \dfrac{-2}{4} = -\dfrac{1}{2}$ or -0.5

19) Refer to the graph below.

Given the graph above, find $f(8)$.

A. 0

B. 1

(C.) 6

D. 8

20) The table below gives selected ordered pairs for the linear function, $f(x)$.

Domain	Range
x	$f(x)$
12	16
15	18
18	20
21	22

Slope = rise/run = change in y/change in x = $\frac{2}{3}$

Which of the following functions has the same slope as $f(x)$?

A. $g(x) = x + 7$

B. $h(x) = 2x + 2$

(C.) $q(x) = \frac{2}{3}x + 8$ ← the only answer with a slope of $\frac{2}{3}$

D. $p(x) = \frac{3}{2}x + 5$

Part I – Long Response – Calculator Use Allowed

A. Consider the equation below. *Algebraic Equation*

$15x - 10 = 10(x + 1)$

What value of x will make the equation true?

$15x - 10 = 10(x + 1)$

$15x - 10 = 10x + 10$

$ +10 +10$

$15x = 10x + 20$

$-10x -10x$

$5x = 20 \qquad \boxed{x = 4}$

B. Given the function $f(x) = 2x^3 + x^2 - 3x$, find the value of $f(3)$.

Function

$f(3) = 2(3)^3 + (3)^2 - 3(3)$

$2(27) + 9 - 9$

$\boxed{54}$
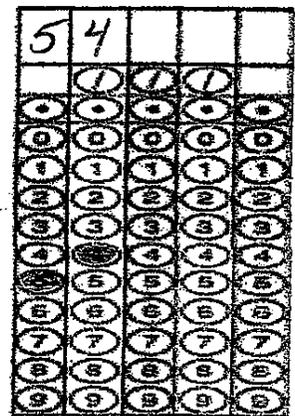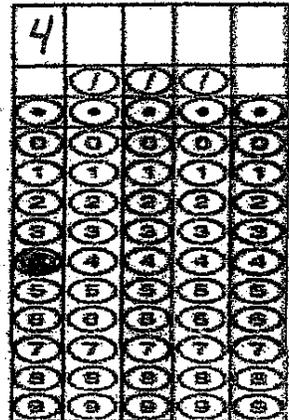
C. To the nearest centimeter, what is the diameter of a soccer ball given that its circumference is 69 centimeters?

(Use $\pi = 3.14$)

Circumference $C = \pi d$

$\dfrac{69 = (3.14)d}{3.14 \qquad 3.14}$

$21.97452229 = d$

$22 \approx d$
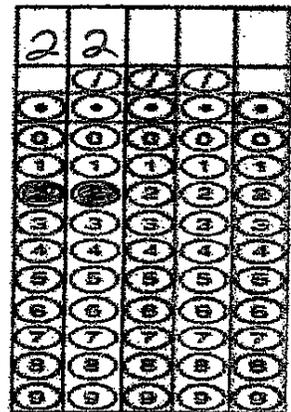
D. Find the next *y*-value in this exponential function.

x	y
-1	0.25
0	1
1	4
2	16
3	64
4	?256

$\Big\} \times 4$

$\Big\} \times 4$

$\Big\} \times 4$

$64 \times 4 = 256$

2	5	6		
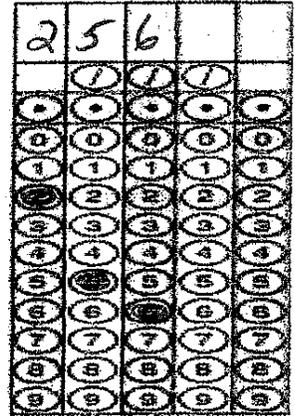
E. Solve for x: $\sqrt{6+x} = 13$

$$\left(\sqrt{6+x}\right)^2 = (13)^2 \text{ Square both sides}$$

$$6 + x = 169$$
$$-6 \qquad -6$$
$$x = 163 \qquad \boxed{x = 163}$$

1	6	3		
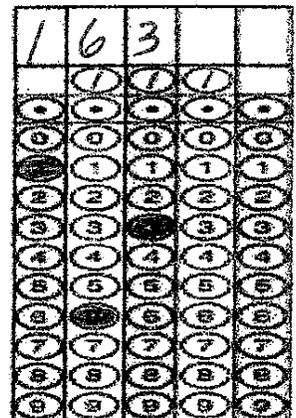
Part II – Calculator Use is NOT Allowed

21) In the diagram below, a plane parallel to the base of a regular square pyramid intersects the pyramid as shown. What shape is formed by the intersection of the regular ~~square pyramid~~ and the plane?
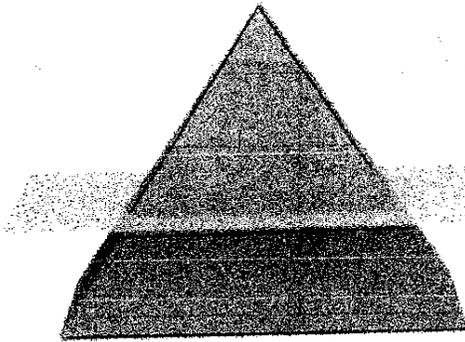
Square based pyramid

A.   B.   (C.)   D.
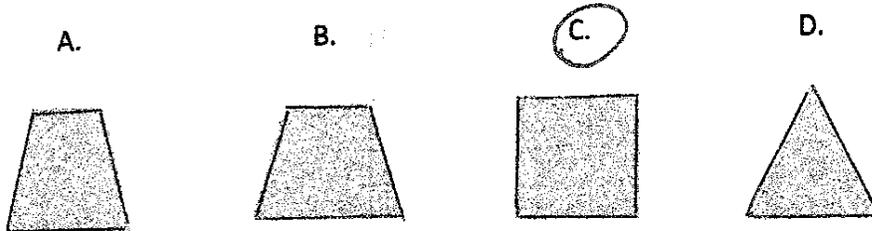
22) What shape will be created by the graph of $y = x^2 - 10x + 25$

A. a square with sides that measure 5 units

B. a line that crosses the y-axis at the point (0, 25)

C. a circle with radius 5

(D.) a parabola containing the point (5, 0)

Quadratic Equation
Graph: parabola

$y = x^2 - 10x + 25$
$(x-5)(x-5)$ roots (5)
when $x = 5, y = 0$

23) Which of the following is equivalent to the polynomial expression below? _Polynomial Expression_

$$(7a^8 b^4 - 3a^5 b^3 + 9a^3 b^2) - (-2a^5 b^3 + a^3 b^2 + a^2 b)$$

A. $7a^8 b^4 - a^5 b^3 + 8a^3 b^2 - a^2 b$

B. $13a^6 b^{13} - a^{10} b^6$

C. $12a^4 b^7$

D. $9a^8 b^4 - 2a^5 b^3 + 10a^3 b^2 - a^2 b$

$7a^8 b^4 - 3a^5 b^3 + 9a^3 b^2$
$+ \quad 2a^5 b^3 - a^3 b^2 - a^2 b$
$\overline{7a^8 b^4 - a^5 b^3 + 8a^3 b^2 - a^2 b}$

24) Which of the graphs below has a slope of 3?

A

B (circled)

Positive Slope

m=3

C

negative slope

D

zero slope
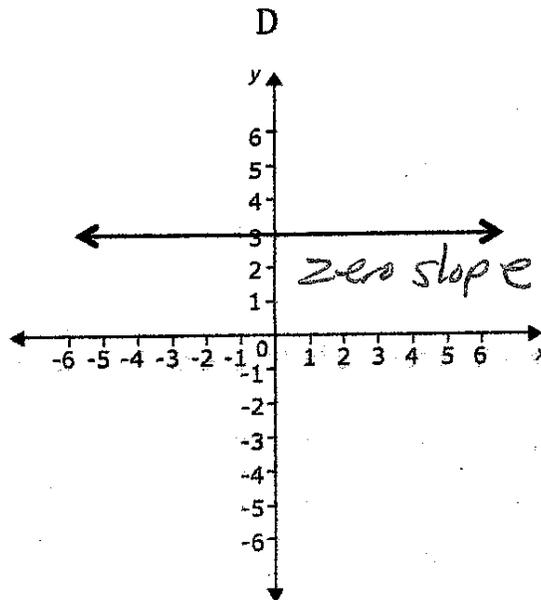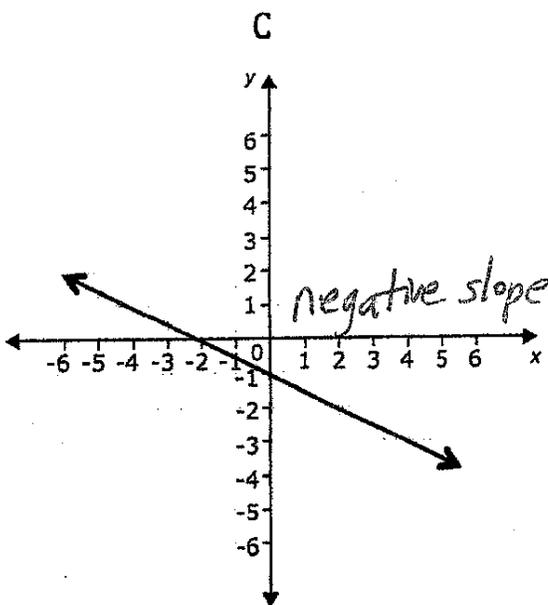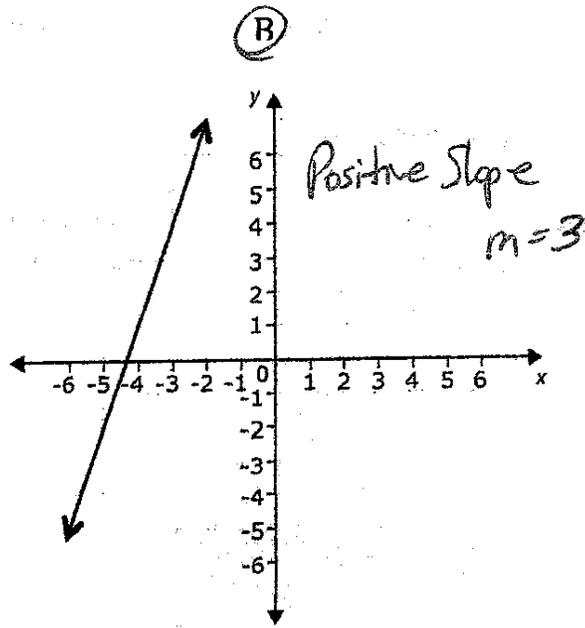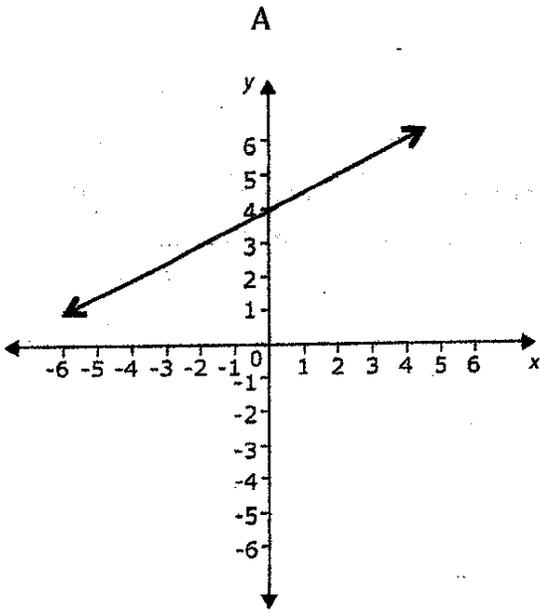
25) To find the mean M of three numbers, we use the formula $M = \frac{x+y+z}{3}$. Which of the following formulas could be used to find the value of z?

A. $z = \frac{3M}{x+y}$

B. $z = \frac{M-x-y}{3}$

C. $z = 3M - x - y$ (circled)

D. $z = 3M + 3x + 3y$

$$3(M) = \left(\frac{x+y+z}{3}\right)^3$$

$$3M = x+y+z$$

$$\frac{-x-y \qquad -x-y}{3M-x-y = z}$$

26) Marlene signs a lease for an apartment in 2014. Her monthly rent increases every year after the first. The equation y=150x+1000 can be used to model her monthly rent, y, where x=0 represents 2014. Which statement describes her monthly rent?

A. Her rent was $150 in 2014 and it is now $1000

B. Her monthly rent was $1000 in 2014 and it has increased by $150 per year since then

C. Her monthly rent was $150 in 2014 and has increased by $1000 per year since then

D. Her monthly rent was $1000 in 2014 and it has increased by $1.50 each year since then

27) Which of these is defined as a part of a line that has one endpoint and extends in one direction without ending?

Ray

A. arc

B. line

C. ray

D. vertex

28) Alyssa plays soccer (s) and baseball (b). She burns 400 calories/hour playing soccer and 50 calories/hour playing baseball. Each week she is willing to spend *at most* 20 hours exercising and wishes to burn *at least* 4000 calories.

Which system of inequalities can Alyssa use to determine the possible exercise plans she can have?

A. $s+b \geq 20$
   $400s + 50b \geq 4000$

B. $s+b \geq 20$
   $400s + 50b \leq 4000$

C. $s+b \geq 4000$
   $400s + 50b \leq 20$

D. $s+b \leq 20$
   $400s + 50b \geq 4000$

S = soccer — 400 calories = 400 s
b = baseball — 50 calories = 50 b
at least 4000 ≥ 4000
S+b ≤ 20

29) Choose the expression below that is equivalent to $\frac{p^3(m^{-2}n^4)^3}{n^{-2}}$

A. $m^{-6}n^{14}$

B. $-p^3mn^5$

C. $p^3m^{-6}n^{14}$

D. $p^9m^{-6}n^{10}$

$$\frac{p^3(m^{-2}n^4)^3}{n^{-2}} = \frac{p^3m^{-6}n^{12}}{n^{-2}} = p^3m^{-6}n^{12}n^2$$
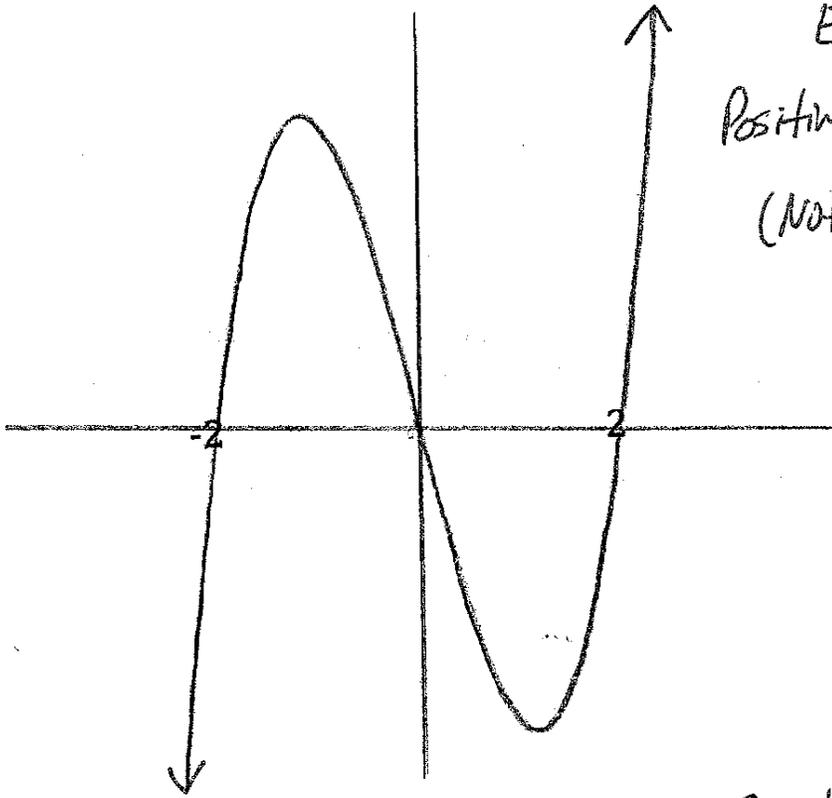
$$\boxed{p^3m^{-6}n^{14}}$$

30) Which of the following is an irrational number?

$\quad$ A. $\sqrt{3} = 1.732050808$

$\quad$ B. $2.875 = 2\frac{875}{1,000} = \frac{2875}{1000}$

$\quad$ C. $\sqrt{9} = 3 = \frac{3}{1}$

$\quad$ D. $-\frac{2}{3}$

Rational / Irrational Numbers

Irrational numbers cannot be expressed as a ratio of integers or repeating decimals.

31) Refer to the graph below:

Which function represents the graph above?

$\quad$ A. $f(x) = x^2 - 4$ (quadratic)

$\quad$ B. $f(x) = x^3 - 4x$

$\quad$ C. $f(x) = x^3 - 4$

$\quad$ D. $f(x) = x^3 + x^2 - 4x - 4$

Polynomial Graph
$\qquad$ End Behavior

Positive

(Note: Part 2, no calculator use)

Graphing Polynomials
$\qquad$ to the 3rd degree

— End behavior
— Leading coefficient test
— Table of values

32) Nina discovered that this year, she is $\frac{1}{4}$ the age of her mother minus $\frac{1}{4}$ her own age. How could Nina express this algebraically?

A. $N = \frac{N}{4} - 4M$

B. $N = \frac{M+N}{4}$

C. $N = \frac{M-N}{4}$ (circled)

D. $N = \frac{M}{4} - 4N$

N → Nina

M → Mother

$$\frac{1}{4}(M-N) = \frac{M-N}{4}$$

33) On the graph shown below, what is the minimum for the interval $x = -2$ to $x = 2$?

maximum pt.

Polynomial Graph

minimum pt.
(1, -2)

A. (2, 0)

B. (-1, 1)

C. (-2, 2)

D. (1, -2) (circled)
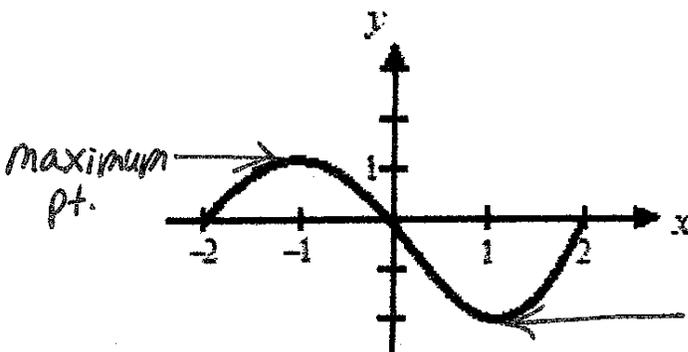
34) Two rectangles are similar and the dimensions shown are in centimeters.
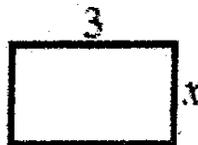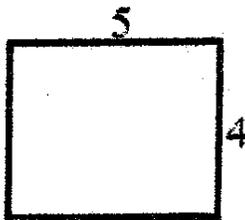
Ratio/Proportion

+

Conversion of Fractions to decimals w/o calculator use.

What is the measure of x, in centimeters?

A. 1.8

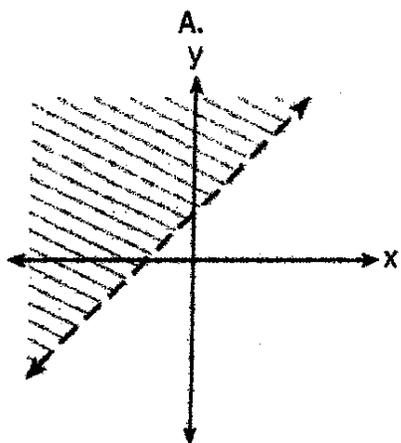B. 2.4 (circled)

C. 2.6

D. 2.8

$$\frac{width}{length} = \frac{4}{5} = \frac{x}{3}$$

$$5x = 3(4)$$
$$\frac{5x}{5} = \frac{12}{5} \quad x = 2\frac{2}{5} = 2.4$$

35) Consider this inequality: $y \geq x + 3$

Which of these shaded half-planes represents the solution region of the inequality?

Graphs of Inequalities

A.

B.

(C.)

D.
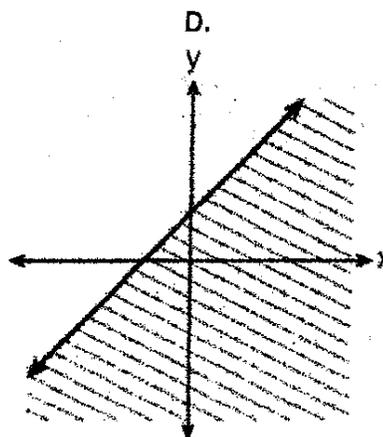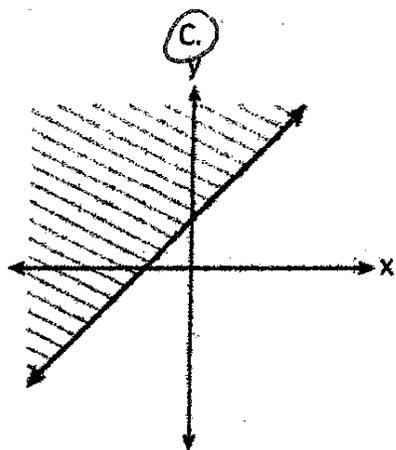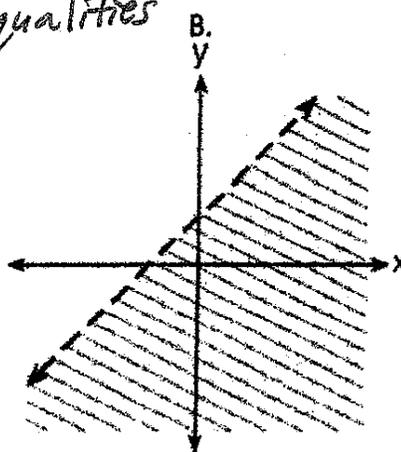
36) Michelle wrote the letters of her first and last name on separate cards:

$\underbrace{\text{MICHELLE}}_{8} \quad \underbrace{\text{LANDRY}}_{6 \text{ letters}}$

Then she placed the cards face down in two piles, one for her first name, and one for her last name. If Michelle picks a card at random from each pile, what is the probability that she will choose an E and a **Y?**

(A.) $\dfrac{1}{24}$

B. $\dfrac{1}{15}$

C. $\dfrac{1}{11}$

D. $\dfrac{1}{12}$

Probability

Total # of letters → 14

Total # of letter E → 2 out of 8

Total # of letter Y → 1 out of 6

$\dfrac{2}{8} \cdot \dfrac{1}{6} = \dfrac{2}{48} = \boxed{\dfrac{1}{24}}$

37) Which system of equations corresponds to this graph?

$x=3$

$y=x-1$

y-intercept $= -1$
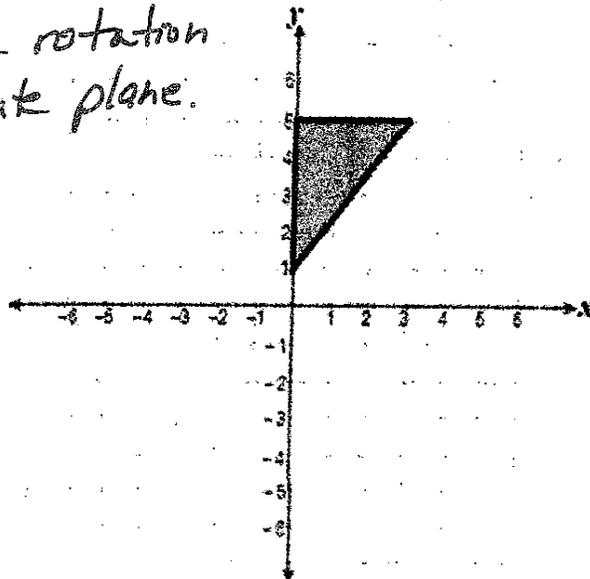
$x=3$
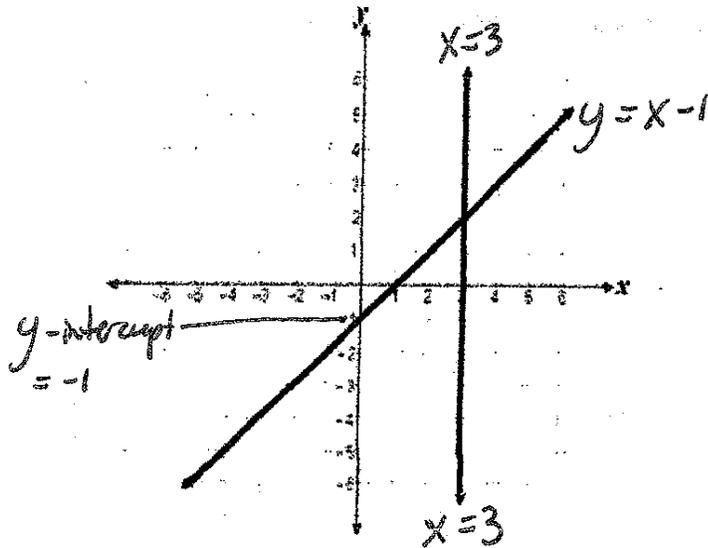
A. $y=3$; $y=x-1$

B. $x=3$; $y=x-1$

C. $y=3x$; $y=x+1$

D. $y=3$; $y=x+1$

Systems of Equations

38) Imagine that this triangle rotates 360° around the *y*-axis. What three-dimensional figure will it form?
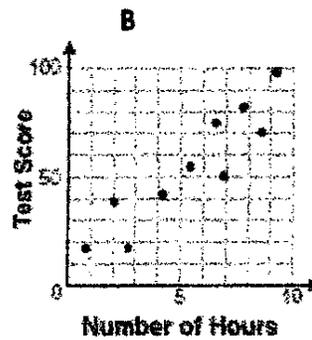
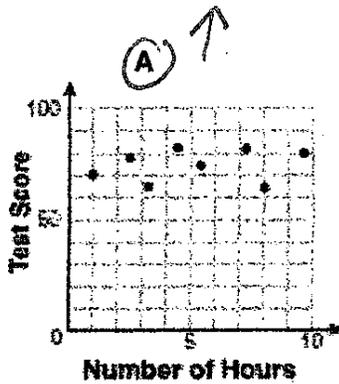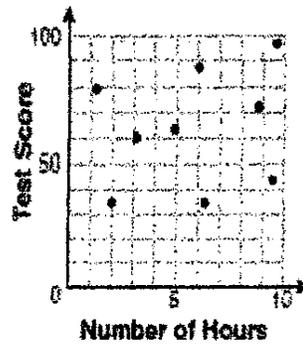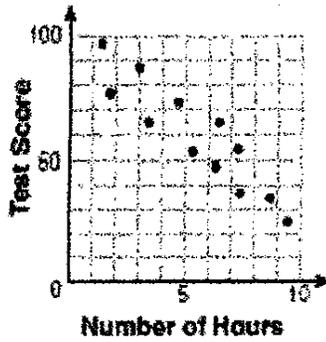*Three-d figure rotation on the coordinate plane.*

A. cone

B. prism

C. sphere

D. cylinder

39) There is a negative correlation between the number of hours a student watches television and his or her social studies test score. Which scatter plot below displays this correlation?
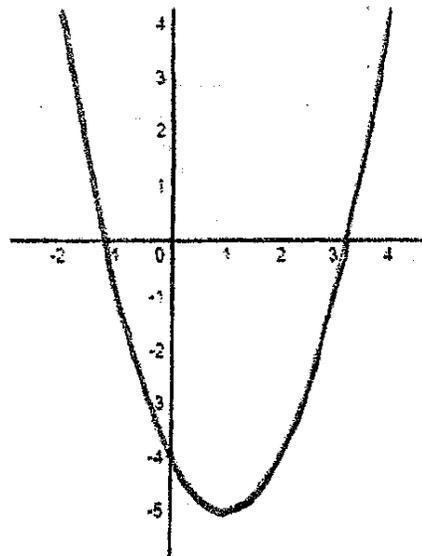
Scatter Plots

A

B

C

D

40) Which of the following best describes key features of the graph of the function $f(x) = x^2 - 2x - 8$ shown below?

Quadratic Equation

← Graph
End behavior

A. The vertex of the graph is found at (1, -5) and the axis of symmetry is the line y = 1.

B. The vertex of the graph is found at (1, -5) and the axis of symmetry is the line x = 1.

C. The vertices of the graph are found at -1 and 3 and the axis of symmetry is found at (1, -5).

D. The vertices of the graph are found at -1 and 3 and the axis of symmetry is found at (-5, 1).

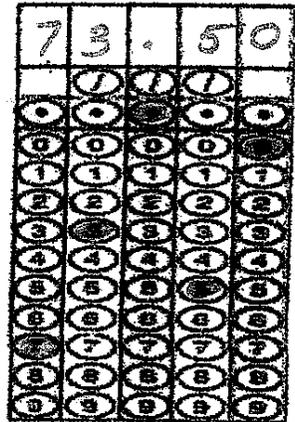**Part II – Long Response – Calculator Use is <u>Not</u> Allowed**

F. An employee earns $10.50 per hour. On Monday, she works from 8:00 a.m. until 4:00 p.m., and she takes a one hour unpaid lunch break

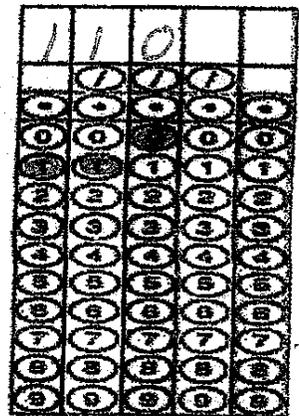   How much does the employee earn on Monday?

   8AM – 4PM
   (8 hours)
   Minus 1 hour unpaid
   Lunch break 8-1=7hrs.
   7 x $10.50 = $73.50

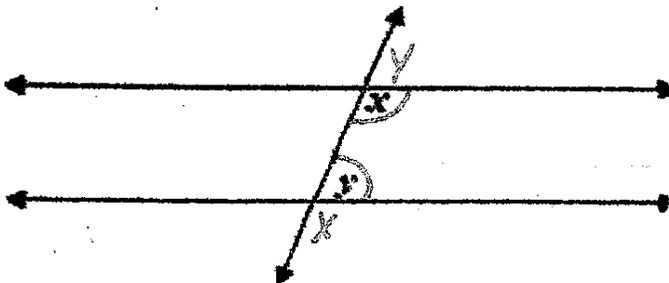G. A car can be purchased for $1090.00 in cash or financed in 24 monthly payments of $50.00.

   How much would be saved by paying cash? $110
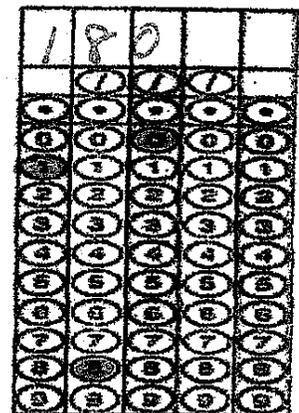
   24 x 50 = $1,200
   $1,200 - $1,090 = $110

H. Two parallel lines are crossed by a transversal. What is the measure of angles $x + y$

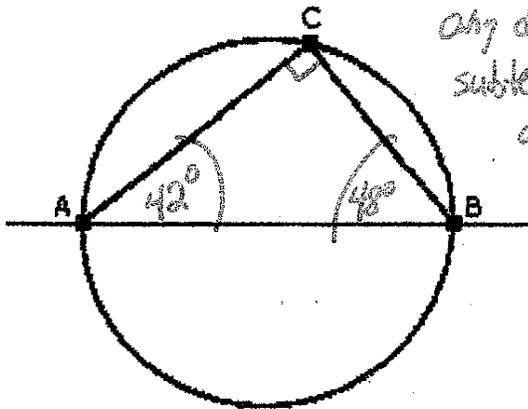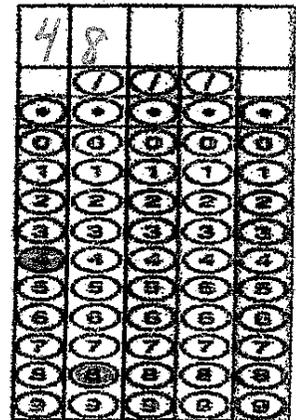 $x + y = 180°$

   Alternate Interior/Exterior Angles

I. *AB* is a diameter of the circle below. If angle *CAB* measures 42°, what is the measure of angle *CBA*?

Thales Theorem states that any diameter of a circle subtends a right-angle to any point on the circle.

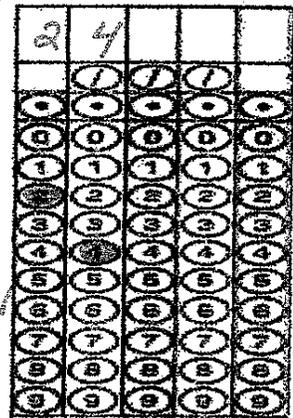**J.** Austin made a scale drawing of a triangular park. The coordinates for the vertices of the park are:

$$(-2, 5), (10, 5), \& (7, 9)$$

His scale is 1 unit = 1 yard.

What is the area of the triangular park in square yards?

Coordinate Plane
Area of a Triangle

Note: This formula must be memorized by the students it is **not** included on the official formula chart!

Area = $\frac{1}{2}bh$

base = 12

$A = \frac{1}{2}bh$

$= \frac{1}{2}(12)(4)$

$= \frac{1}{2}(48)$

$= 24$

Area = 24 sq. yards.