

No Calculator

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The formula below is often used by project managers to compute E , the estimated time to complete a job, where O is the shortest completion time, P is the longest completion time, and M is the most likely completion time.

$$E = \frac{O + 4M + P}{6}$$

Which of the following correctly gives P in terms of E , O , and M ?

- A) $P = 6E - O - 4M$
- B) $P = -6E + O + 4M$
- C) $P = \frac{O + 4M + E}{6}$
- D) $P = \frac{O + 4M - E}{6}$

A. SOLVE FOR P STEPS
 $E = \frac{O + 4M + P}{6}$
 $6E = O + 4M + P$
 $6E - O - 4M = P$

7 **SLICK!**

$$\sqrt{2x+6} + 4 = x + 3$$

What is the solution set of the equation above?

- A) $\{-1\}$
- B) $\{5\}$
- C) $\{-1, 5\}$
- D) $\{0, -1, 5\}$

NOT ASKING TO SOLVE FOR X
A. PLUG IN ANSWERS
B. NOTICE SINCE -1 DIDN'T WORK, YOU CAN KILL A, C, AND D

$\sqrt{2(-1)+6} + 4 = -1 + 3$
 $\sqrt{4} + 4 \neq 2$

$\sqrt{2(5)+6} + 4 = 5 + 3$
 $\sqrt{16} + 4 = 8$
 $4 + 4 = 8$
YUP!

8

$$f(x) = x^3 - 9x$$

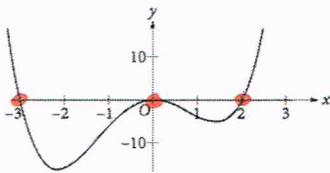
$$g(x) = x^2 - 2x - 3$$

Which of the following expressions is equivalent to $\frac{f(x)}{g(x)}$, for $x > 3$?

- A) $\frac{1}{x+1}$
- B) $\frac{x+3}{x+1}$
- C) $\frac{x(x-3)}{x+1}$
- D) $\frac{x(x+3)}{x+1}$

A. STRAIGHT UP SOLVE
 $\frac{f(x)}{g(x)} = \frac{x^3 - 9x}{x^2 - 2x - 3} = \frac{(x)(x^2 - 9)}{(x-3)(x+3)} = \frac{(x)(x-3)(x+3)}{(x-3)(x+3)} = \frac{x(x+3)}{x+1}$

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Which of the following could be the equation of the graph above?

- A) $y = (x-2)(x+3)$
- B) $y = x^2(x-2)(x+3)$
- C) $y = x(x+2)(x+3)$
- D) $y = x^2(x+2)(x+3)$

A. LOCATE ALL POINTS WHERE $X=0$
 $X = -3$ $X = +2$
 $X+3=0$ $X-2=0$

B. P.O.E.

C. NOTICE WE HAVE $X=0$ AND $X^2=0$
 $X=0$ WOULD HAVE CROSSED THRU X-AXIS
 $X^2=0$ "BOUNCES OFF"

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If $\frac{2a}{b} = \frac{1}{2}$, what is the value of $\frac{b}{a}$?

- A) $\frac{1}{8}$
- B) $\frac{1}{4}$
- C) 2
- D) 4

OR NOTICE
 $2a = 1 \xrightarrow{\text{SO}} a = \frac{1}{2}$
 $b = 2$
SOLVE
 $\frac{b}{a} = \frac{2}{1/2} = \frac{2}{.5} = 4$

A. CROSS-MULTIPLY
 $\frac{2a}{b} \times \frac{1}{2}$

B. SOLVE FOR 4
 $4a = b$
 $4 = \frac{b}{a}$

14

$$y = x^2 + 3x - 7$$

$$y - 5x + 8 = 0$$

How many solutions are there to the system of equations above?

- A) There are exactly 4 solutions.
- B) There are exactly 2 solutions.
- C) There is exactly 1 solution.
- D) There are no solutions.

A. SET BOTH TO EQUAL Y
 $Y = x^2 + 3x - 7$
 $Y = 5x - 8$

B. NOW SOLVE FOR X
 $x^2 + 3x - 7 = 5x - 8$
 $x^2 - 2x + 1 = 0$
 $(x-1)^2 = 0$
 $x-1=0$
 $x=1$

C. FACTOR
D. SET TO ZERO
E. ONE SOLUTION

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$$g(x) = 2x - 1$$

$$h(x) = 1 - g(x)$$

The functions g and h are defined above. What is the value of $h(0)$?

- A) -2
- B) 0
- C) 1
- D) 2

NOTICE
A. CAREFULLY SET UP
 $h(0) = 1 - (2x - 1)$
 $h(0) = 1 - 2x + 1$
 $= 1 - 0 + 1$
 $= 2$

16

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

If a is a solution of the equation above and $a > 0$, what is the value of a ?

A. FACTOR
 $x^2 + x - 12 = 0$
 $(x+4)(x-3) = 0$
 $x+4=0$ $x-3=0$
 $x=-4$ $x=3$

DONT IGNORE!

17

The sum of $-2x^2 + x + 31$ and $3x^2 + 7x - 8$ can be written in the form $ax^2 + bx + c$, where a , b , and c are constants. What is the value of $a+b+c$?

A. CAREFULLY ADD
 $-2x^2 + x + 31$
 $+ 3x^2 + 7x - 8$
 $\hline 1x^2 + 8x + 23$
 $\frac{a}{1} + \frac{b}{8} + \frac{c}{23} = 32$

With Calculator "DOMAIN" GOES WITH X

GET FAMILIAR!

8

$$x + 1 = \frac{2}{x + 1}$$

In the equation above, which of the following is a possible value of $x + 1$? **A. SIMPLE STEPS**

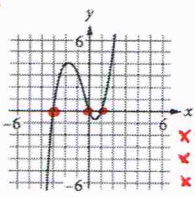
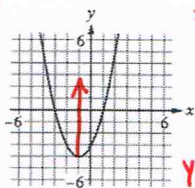
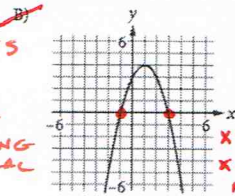
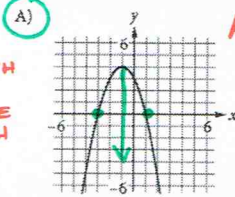
- A) $1 - \sqrt{2}$
- B) $\sqrt{2}$**
- C) 2
- D) 4

A. SIMPLE STEPS
 $x + 1 = \frac{2}{x + 1}$
 $(x + 1)^2 = 2$
 $\sqrt{(x + 1)^2} = \sqrt{2}$
 $x + 1 = \sqrt{2}$

B. MULTI. DENOM BOTH SIDES
C. SQUARE ROOT BOTH SIDES

19 **SLICK!** GOES WITH Y

The range of the polynomial function f is the set of real numbers less than or equal to 4. If the zeros of $f = \text{MEANS}$ are -3 and 1 , which of the following could be the graph of $y = f(x)$ in the xy -plane?



A. $x = -3$ OR $x + 3 = 0$
B. $x = +1$ OR $x - 1 = 0$
SO THE FORMULA IS $(x + 3)(x - 1)$
P.O.E. ANY WITHOUT $x = -3$ $x = 1$

B. P.O.E. ANY WITHOUT RANGE ≤ 4 OR $y \leq 4$
 $y \geq -4$ NO!

13

If $a^{-\frac{1}{2}} = x$, where $a > 0$, what is a in terms of x ? **A. EXPONENT RULES**

- A) \sqrt{x}
- B) $-\sqrt{x}$
- C) $\frac{1}{x^2}$**
- D) $-\frac{1}{x^2}$

A. EXPONENT RULES
 $a^{-\frac{1}{2}} = x$
B. MOVE EXPONENT RIGHT USING RECIPROCAL
 $a = x^{-2}$
C. FLIP CHANGE SIGN OF EXPONENT
 $a = \frac{1}{x^2}$

14

Which of the following is a value of x for which the expression $\frac{-3}{x^2 + 3x - 10}$ is undefined? **" = DENOMINATOR IS ZERO"**

- A) -3
- B) -2
- C) 0
- D) 2**

A. SET DENOM = 0
 $x^2 + 3x - 10 = 0$
B. FACTOR
 $(x + 5)(x - 2) = 0$
C. SOLVE FOR ZERO
 $x + 5 = 0$ $x - 2 = 0$
 $x = -5$ $x = 2$
D. MATCH WITH ANSWER

23

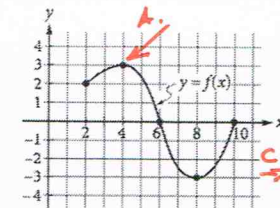
$$M = 1,800(1.02)^t$$

The equation above models the number of members, M , of a gym t years after the gym opens. Of the following, which equation models the number of members of the gym q quarter years after the gym opens?

- A) $M = 1,800(1.02)^q$**
- B) $M = 1,800(1.02)^{4q}$
- C) $M = 1,800(1.005)^{4q}$
- D) $M = 1,800(1.082)^q$

A. P.O.E. EXPONENTS
NOTICE: EXPT
IF $q = 1$ THEN $\frac{1}{4}$
IF $2q = 2$ THEN $\frac{2}{4}$
IF ONE YEAR THEN $\frac{4}{4}$ OR $t = 1$
IF TWO YEARS THEN $\frac{8}{4}$

30 **GET FAMILIAR**

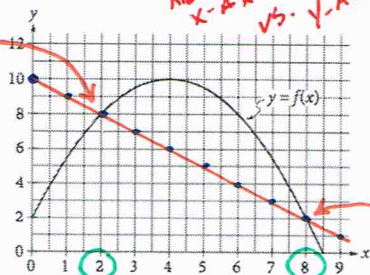


x	g(x)
-2	1
-1	2
0	3
1	4
2	5
3	6
4	7

The complete graph of the function f and a table of values for the function g are shown above. The maximum value of f is k . What is the value of $g(k)$?

- A) 7 **A. FIND HIGHEST Y-VALUE ON XY PLANE = 3 WHICH IS ALSO K**
- B) 6 **B. $g(k) = g(3)$**
- C) 3 **C. FIND 3 ON CHART**
- D) 0 **$g(3) = 6$**

35 **SLICK!** NOTICE X-AXIS! VS. Y-AXIS!



The graph of the function f , defined by

$$f(x) = -\frac{1}{2}(x - 4)^2 + 10,$$

is shown in the xy -plane above. If the function g (not shown) is defined by **A. DRAW IT!**

$$g(x) = -x + 10,$$

what is one possible value of a such that $f(a) = g(a)$? **B. MEANS MORE THAN ONE ANSWER**

C. FIND VALUES OF X WHERE EQUATIONS MEET

2 OR 8