

No Calculator

**2 PEMDAS**

Which of the following is equivalent to  $3(x+5) - 6$ ?

- A)  $3x - 3$
- B)  $3x - 1$
- C)  $3x + 9$**
- D)  $15x - 6$

$3(x+5) - 6$   
 $3x + 15 - 6$   
 $3x + 9$

**5 PLUG IN -1**

If  $f(x) = \frac{x^2 - 6x + 3}{x - 1}$ , what is  $f(-1)$ ?

- A) -5**
- B) -2
- C) 2
- D) 5

$x^2 - 6x + 3$   
 $x - 1$   
 $-1^2 - 6(-1) + 3$   
 $-1 - 1$

$\frac{1 + 6 + 3}{-2} = \frac{10}{-2} = -5$

**7 "COMPLETE THE SQUARE"**

$x^2 + 6x + 4$

Which of the following is equivalent to the expression above?

- A)  $(x+3)^2 + 5$
- B)  $(x+3)^2 - 5$**
- C)  $(x-3)^2 + 5$
- D)  $(x-3)^2 - 5$

STEP 1  $|x^2 + 6x| + 4$   
 STEP 2 COMPLETE SQUARE  $6 \div 2 = 3$   
 so  $(x+3)^2$

STEP 3 DISTRIBUTE/FOIL  
 $(x+3)^2$   
 $x^2 + 6x + 9$

STEP 4 NOW SELECT ANSWER THAT GIVES YOU  $x^2 + 6x + 4$

**10 MATH VOCAB GET FAMILIAR WITH WORDING!**

$ax^3 + bx^2 + cx + d = 0$

In the equation above,  $a$ ,  $b$ ,  $c$ , and  $d$  are constants.

If the equation has roots  $-1$ ,  $-3$ , and  $5$ , which of the following is a factor of  $ax^3 + bx^2 + cx + d$ ?

- A)  $x - 1$
- B)  $x + 1$**
- C)  $x - 3$
- D)  $x + 5$

"HAS ROOTS" MEANS  $x = -1$   
 $x = -3$   
 $x = +5$

SOOOO...  $x+1=0$   
 $x+3=0$   
 $x-5=0$

**11 EXPONENT AND RADICAL RULES**

The expression  $\frac{x^{-2}y^2}{x^3y^{-1}}$ , where  $x > 1$  and  $y > 1$ , is equivalent to which of the following?

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

THIS QUESTION IS TRULY RECOGNITION AND REACTION

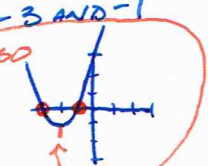
REMEMBER  
 $x^{-1} = \frac{1}{x^1}$   
 $x^{\frac{1}{2}} = \sqrt{x}$

**12 PARABOLA BASICS**

The function  $f$  is defined by  $f(x) = (x+3)(x+1)$ . The graph of  $f$  in the  $xy$ -plane is a parabola. Which of the following intervals contains the  $x$ -coordinate of the vertex of the graph of  $f$ ?

- ~~A)  $-4 < x < -3$~~
- B)  $-3 < x < -1$**
- ~~C)  $1 < x < 3$~~
- ~~D)  $3 < x < 4$~~

STEP 1:  $x+3=0$   $x+1=0$  SET TO ZERO!  
 $x = -3$   $x = -1$   
 STEP 2: X MUST FALL IN BETWEEN -3 AND -1  
 STEP 3: POE! ALSO



**13 OLD SKOOL LONG DIVISION**

Which of the following expressions is equivalent to  $\frac{x^2 - 2x - 5}{x - 3}$ ?

- ~~A)  $x - 5 - \frac{20}{x - 3}$~~
- ~~B)  $x - 5 - \frac{10}{x - 3}$~~
- C)  $x + 1 - \frac{8}{x - 3}$
- D)  $x + 1 - \frac{2}{x - 3}$**

$x+1$   
 $x-3 \overline{) x^2 - 2x - 5}$   
 $-x^2 - 3x$   
 $+1x - 5$   
 $-1x - 3$   
 $NOTICE -2$   
 $REMAINDER = -2$   
 BUT ALSO =  $\frac{-2}{x-3}$

DON'T FORGET TO CHANGE THE SIGN AND ADD WHEN SUBTRACTING NEGATIVE NUMBERS

**15 RADICAL RULES / PLUG IN ANSWERS**

The expression  $\frac{1}{3}x^2 - 2$  can be rewritten as

$\frac{1}{3}(x-k)(x+k)$ , where  $k$  is a positive constant.

What is the value of  $k$ ?

- A) 2
- B) 6
- C)  $\sqrt{2}$**
- D)  $\sqrt{6}$

$\frac{1}{3}(x-k)(x+k)$   
 $\frac{1}{3}(x-\sqrt{2})(x+\sqrt{2})$  FOIL  
 $\frac{1}{3}x^2 - 2$  MATCH!!

With Calculator

2 SIMPLE SOLVE / WATCH YOUR NEGATIVE #'S

$(x^2 - 3) - (-3x^2 + 5)$

Which of the following expressions is equivalent to the one above?

AS YOU SOLVE, POE!

A)  $4x^2 - 8$

$(x^2 - 3) - (-3x^2 + 5)$

B)  $4x^2 - 2$

$x^2 - (-3x^2) = 4x^2$

C)  $-2x^2 - 8$

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

D)  $-2x^2 - 2$

6 PLUG IN & SOLVE CAREFULLY

In the equation  $(ax + 3)^2 = 36$ ,  $a$  is a constant. If

$x = -3$  is one solution to the equation, what is a possible value of  $a$ ?

$(ax + 3)^2 = 36$

A) -11

$\sqrt{(ax + 3)^2} = \sqrt{36}$

B) -5

$ax + 3 = 6 \rightarrow a(-3) = 3$

C) -1

$ax = 3 \rightarrow a = \frac{3}{-3} = -1$

D) 0

$a(-3) = 3$

LIKE ACT SCIENCE

Questions 19 and 20 refer to the following information.

Mosteller's formula:  $A = \frac{\sqrt{hw}}{60}$

Current's formula:  $A = \frac{4 + w}{30}$

The formulas above are used in medicine to estimate the body surface area  $A$ , in square meters, of infants and children whose weight  $w$  ranges between 3 and 30 kilograms and whose height  $h$  is measured in centimeters.

19 SOLVE FOR W GET FAMILIAR WITH WORDING!

Based on Current's formula, what is  $w$  in terms of  $A$ ?

A)  $w = 30A - 4$

B)  $w = 30A + 4$

C)  $w = 30(A - 4)$

D)  $w = 30(A + 4)$

$A = \frac{4 + w}{30}$  MULTIPLY 30 BOTH SIDES  
 $30A = 4 + w$  SUBTRACT 4 BOTH SIDES  
 $30A - 4 = w$

20 SOLVE FOR  $\sqrt{HW}$  GET FAMILIAR WITH WORDING!

If Mosteller's and Current's formulas give the same estimate for  $A$ , which of the following expressions is equivalent to  $\sqrt{hw}$ ?

A)  $\frac{4 + w}{2}$

$\frac{\sqrt{HW}}{60} = \frac{4 + w}{30}$  SET THEM UP

B)  $\frac{4 + w}{1,800}$

$\sqrt{HW} = \frac{4 + w(60)}{30}$  MULTIPLY BOTH SIDES BY 60

C)  $2(4 + w)$

$\sqrt{HW} = 4 + w(2)$  REDUCIFICATION!

D)  $\frac{(4 + w)^2}{2}$

24 FORMULA INTERPRETATION

$h(t) = -16t^2 + 110t + 72 = ax^2 + bx + c$

The function above models the height  $h$ , in feet, of an object above ground  $t$  seconds after being launched straight up in the air. What does the number 72 represent in the function?

$c = y$ -INTERCEPT

A) The initial height, in feet, of the object

B) The maximum height, in feet, of the object

C) The initial speed, in feet per second, of the object

D) The maximum speed, in feet per second, of the object

27 ENGLISH TO MATH TRANSLATION

The world's population has grown at an average rate of 1.9 percent per year since 1945. There were approximately 4 billion people in the world in 1975. Which of the following functions represents the world's population  $P$ , in billions of people,  $t$  years since 1975? (1 billion = 1,000,000,000)

= EXPONENTIAL GROWTH! GET FAMILIAR WITH WORDING!

A)  $P(t) = 4(1.019)^t$

← EXPONENTIAL GROWTH

B)  $P(t) = 4(1.9)^t$

C)  $P(t) = 1.19t + 4$

$1.9\% = .019$

D)  $P(t) = 1.019t + 4$

35 SOLVE FOR X

$y = x^2 - 4x + 4$   
 $y = 4 - x$

GET FAMILIAR WITH WORDING!

If the ordered pair  $(x, y)$  satisfies the system of equations above, what is one possible value of  $x$ ?

↳ MEANS MORE THAN ONE ANSWER IS O.K.

STEP!  $x^2 - 4x + 4 = 4 - x$

SET EQUATIONS EQUAL TO EACH OTHER THEN SOLVE!

$x^2 - 3x = 0$

$x(x - 3) = 0$

$x = 0$

OR  $x = 3$