

# Math test no calculator

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1) If  $(x+1)/(x-1) = a$  and  $a=2$  then what is the value of  $x$ ?

A 1

B 2

**C 3**

D 4

Sol :  $(x+1)/(x-1) = 2$  ;  $x+1 = 2(x-1)$  ;  $x = 3$ ;

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2) If  $i = \sqrt{-1}$ , what is the value of the expression  $(-8+3i) - (7-4i)$  ?

A  $-1+7i$

**B  $-15+7i$**

C  $-1-7i$

D  $-15-7i$

Sol :  $(-8+3i) - (7-4i) = -8+3i-7+4i = -15+7i$

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3) On a Sunday, Ethan reads  $p$  number of pages per hour for 3 hours and Caleb reads  $q$  number of pages per hour for 7 hours. Which of the following expression gives the total number of pages read by Ethan and Caleb on that Sunday?

A  $3q+7p$

B  $21(p+q)$

C  $21pq$

**D  $3p+7q$**

Sol : for 3 hours Ethan reads  $3p$  pages and for 7 hours Caleb reads  $7q$  pages. Total number of pages read are  $3p+7q$

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- 4) A lift which picks up some people drops people at various floors as it ascends. The number of people at any floor is given by the equation  $p = 26 - 2f$ . where  $p$  is the number of people in the lift and  $f$  is the floor which takes values from 0,1,2,3 etc. what is the meaning of 26 in this equation?

A the lift will finish dropping all people at the 26<sup>th</sup> floor

**B** 26 people get on the lift at the ground floor

C 26 people get out of the lift every floor

D 26 people get out of the lift every two floors

Sol : at  $f = 0$  floor the number of people in the lift are 26 , so option B

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- 5)  $6x^2 + 2xy^2 + 3xy + y^3$

Which of the following is equivalent to the expression above?

A  $(2y+x)(3y + x^2)$

B  $(2x +y)(3y +x^2)$

**C**  $(2x +y)(3x + y^2)$

D  $(2y + x)(3x + y^2)$

Sol :  $6x^2 + 2xy^2 + 3xy + y^3 = 2x(3x + y^2) + y(3x + y^2) = (2x + y)(3x + y^2)$ ;

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- 6)  $W = -222 + 5.49h$

A dietary assistant uses the above model to estimate the weight needed ( $w$ ) in lb in terms of the height in cm, for the age greater than 18 or above. Based on the model, what is the estimated increase in weight for one cm increase in height?

**A** 5.49

B 6.25

C 7.35

D -222

Sol : we need to calculate the slope of the equation which is 5.49

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7) When capacitance is connected in series , the total capacitance is given by the formula

$1/C_t = 1/C_1 + 1/C_2$  which of the following expressions give me  $C_2$  in terms of  $C_t$  and  $C_1$  .

A  $C_2 = 1/C_t - 1/C_1$

B  $C_2 = 1/C_1 - 1/C_t$

C  $C_2 = (C_t C_1) / (C_t - C_1)$

**D**  $C_2 = (C_t C_1) / (C_1 - C_t)$

Sol :  $1/C_2 = 1/C_t - 1/C_1 = (C_1 - C_t) / (C_t C_1)$  ;

$$C_2 = (C_t C_1) / (C_1 - C_t)$$

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8) If  $a^2/b = 3$  then what is the value of  $3b^2/a^4$  ?

A  $1/27$

**B**  $1/3$

C 3

D 27

Sol :  $a^4/b^2 = 9$  ;  $b^2/a^4 = 1/9$  ;  $3b^2/a^4 = 3/9 = 1/3$

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9)  $2x + 3y = 28$

$$y - 3x = 2;$$

What is the solution to the system of equations above?

A ( 2,6)

B ( 1,8)

**C** ( 2,8)

D ( 1,6)

Sol :  $y = 3x + 2$ ;  $2x + 3(3x + 2) = 28$ ;  $11x + 6 = 28$ ;  $x = 2$ ;  $y = 8$ ; (2,8)

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10)  $f(x) = ax^2 + bx + 20$  and  $a, b$  are constants . If  $f(-1) = f(1)$  and  $f(2) = 40$  then what is the value of  $f(3)$  ?

**A** 65

B 60

C 55

D 50

Sol: from  $f(-1) = f(1)$  we get  $b = 0$ ; therefore  $f(x) = ax^2 + 20$  ;  $f(2) = 4a + 20 = 40$  ;  
 $a = 5$ ;  $f(x) = 5x^2 + 20$  ;  $f(3) = 65$ ;

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$$a = 35 - 5n$$

$$m = 50 - 10n$$

11) The price for a bag of apricots and mangoes depends on the  $n$ th day of sale by the above equations respectively. What is the price per bag of apricots when it is equal to the price per bag of mangoes?

A 3

**B** 20

C 25

D 20

Sol: given  $35 - 5n = 50 - 10n$ ;  $n = 3$ ; price per bag of apricots =  $35 - 5(3) = 20$

12) A line in the  $xy$  plane passes through  $(0,0)$  and  $(5,3)$  which of the following points also lie on line  $L$ ?

A  $(5,2)$

B  $(3,5)$

C  $(3,4)$

**D**  $(10,6)$

Sol: the slope of the line is  $(3-0)/(5-0) = 3/5$ . Equation of the line if  $y = (3/5)x$  .  
 $(10,6)$  satisfies the equation.

13) If  $a \neq b \neq 0$  which of the following is equivalent to

$$1/(1/a+1/b) + 1/(1/a - 1/b)$$

A  $2ba^2/(b^2 - a^2)$

**B**  $2ab^2/(b^2 - a^2)$

C  $2ab^2/(a^2 - b^2)$

D  $2ba^2/(a^2 - b^2)$

$$\text{Sol: } 1/(1/a+1/b) + 1/(1/a - 1/b) = ab/(a+b) + ab/(b-a) = ab(2b)/(b^2 - a^2) = 2ab^2/(b^2 - a^2);$$

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14) If  $x - y = 1$  what is the value of  $(2^y 3^x)/(2^x 3^y)$  ?

A  $2/3$

B 4

**C  $3/2$**

D 9

$$\text{Sol: } (2^y 3^x)/(2^x 3^y) = 3^{(x-y)} / 2^{(x-y)} = 3/2$$

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15) If  $(x + a)(bx - c) = x^2 + x - 6$  for all values of  $x$ . What are two possible values of  $a$ ?

A 2 and -3

**B -2 and 3**

C 4 and 3

D 3 and -4

$$\text{Sol: } bx^2 - cx + abx - ac = x^2 + x - 6$$

Equating the coefficients we get,  $b = 1$ ,  $a - c = 1$ ,  $ac = 6$ ;

Solving  $a - c = 1$ ,  $ac = 6$ ; we get  $a = -2, 3$

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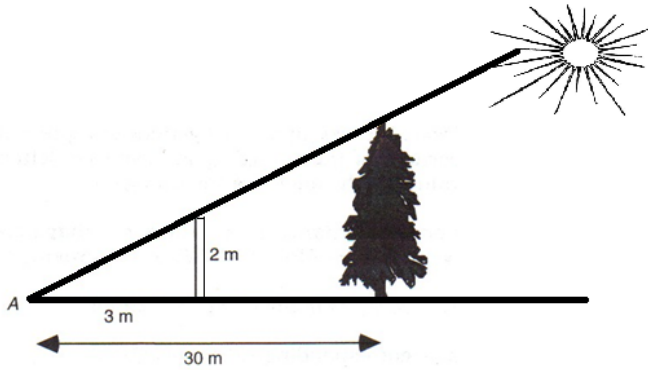
16) If  $t < 0$  and  $(t-2)^2 - 9 = 0$  what is the value of  $t$ ?

-1
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$$\text{Sol: } (t-2)^2 - 9 = 0 ; t-2 = 3 \text{ or } -3 ;$$

$t = 5$  or  $-1$ ; since  $t < 0$   **$t = -1$** ;

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- 17) The shadow of a 2 meter wall exactly coincides with the shadow of a tree shown in the figure above at point A. If the shadow of the wall is 3 meters and that of the tree is 30 meters then what is the height of the tree?

20

Sol: consider similar triangles.  $\frac{2}{3} = \frac{x}{30}$  ;  $x = 20$  meters

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- 18) In this system of equations what is the value of  $x - y$  ?

$$x + 3y = 19 ;$$

$$3x + y = 25 ;$$

3

Sol:  $(3x + y = 25) - (x + 3y = 19) \Rightarrow 2x - 2y = 6$ ;  $x - y = 3$

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- 19) In a right triangle, two acute angles are  $x$  and  $y$ . If  $\cos(x) = \frac{3}{5}$  what is the value of  $\sin(y)$  ?

$\frac{3}{5} = .6$

Sol:  $\sin(y) = \sin(90-x) = \cos(x) = \frac{3}{5} = .6$

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- 20) If  $\sqrt{a} = 2\sqrt[3]{3}$  and  $2\sqrt{b} = \sqrt[3]{3x}$  and if  $a = b$  what is the value of  $x$ ?

64

$$\text{Sol: } 4\sqrt[3]{3} = \sqrt[3]{3x} ;$$

$$64 * 3 = 3x ; x = 64$$

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