

NO calculator may be used on these questions.

1. $(x^2y^3)^{\frac{1}{2}}(x^2y^3)^{\frac{1}{3}} = x^{\frac{a}{3}}y^{\frac{a}{2}}$ If this equation, where a is a constant, is true for all positive values of x and y , what is the value of a ?

- A) 2 B) 3 C) 5 D) 6

2. A parachute design uses 18 separate pieces of rope. Each piece of rope must be at least 270 centimeters and no more than 280 centimeters long. What inequality represents all possible values of the total length of rope, x , in centimeters, needed for the parachute?

- A) $270 \leq x \leq 280$ B) $4860 \leq x \leq 4870$ C) $4860 \leq x \leq 5040$ D) $5030 \leq x \leq 5040$

3. If the equation $y = (x - 6)(x + 12)$ is graphed in the xy -plane, what is the x -coordinate of the parabola's vertex?

- A) -6 B) -3 C) 3 D) 6

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use the power rule 1st:

$$\begin{aligned} & (x^2y^3)^{\frac{1}{2}}(x^2y^3)^{\frac{1}{3}} \\ &= (x^{2 \cdot \frac{1}{2}}y^{3 \cdot \frac{1}{2}})(x^{2 \cdot \frac{1}{3}}y^{3 \cdot \frac{1}{3}}) \\ &= (x^1y^{\frac{3}{2}})(x^{\frac{2}{3}}y^1) \end{aligned}$$

a must
= 5

use the product rule 2nd:

$$\begin{aligned} &= x^{1+\frac{2}{3}}y^{\frac{3}{2}+1} \\ &= x^{\frac{3}{3}+\frac{2}{3}}y^{\frac{3}{2}+\frac{2}{2}} \\ &= x^{\frac{5}{3}}y^{\frac{5}{2}} \end{aligned}$$

compared exponents on both sides:

$$x^{\frac{5}{3}}y^{\frac{5}{2}} = x^{\frac{a}{3}}y^{\frac{a}{2}}$$

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The difference between 270 & 280 is 10.

If you multiply each by 18 the difference between them will be $18 \cdot 10 = 180$

ANSWER C is the only choice with a difference of 180.

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- A) -6 B) -3 C) 3 D) 6

$$y = (x-6)(x+12)$$

x -intercepts are 6, -12

the Line of Symmetry is exactly in the middle of these

$$x\text{-intercepts: } x = \frac{-12+6}{2} = \frac{-6}{2} = -3$$

The x -coordinate of the Vertex = LOS

