

## **ANSWER KEYS**

1. (2)	<b>2.</b> (3)	<b>3.</b> (3)	<b>4.</b> (-1)	<b>5.</b> (2)	<b>6.</b> (1)	<b>7.</b> (4)	<b>8.</b> (2)	
9 (1)	10 (2)							

Since, 
$$5x - 1 < x^2 + 2x + 1$$

Since, 
$$5x - 1 < x^2 + 2x + 1$$

$$\Rightarrow x^2 - 3x + 2 > 0$$
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Again, 
$$x^2 + 2x + 1 < 7x - 3$$

$$\Rightarrow x^2 - 5x + 4 < 0$$
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$$\Rightarrow (x-1)(x-4) < 0 \ \Rightarrow 1 < x < 4 \qquad \ldots (2)$$

$$2 < x < 4$$
Since,  $x$  is integral, then the required value is  $x = 3$ .

$$(x-2)^4(x-3)^3(x-4)^2(1-x) \le 0$$
  
 $\Rightarrow (x-2)^4(x-3)^3(x-4)^2(x-1) \ge 0$ 

Using wavy-curve method, we get 
$$x \in (-\infty,1] \cup [3,\infty)$$
 mathongo  $x \in (-\infty,1] \cup [3,\infty)$ 

$$\Rightarrow x \in \left(\frac{1}{2}, 2\right] \text{ and } x \in \left(-\infty, \frac{1}{2}\right) \cup \left(1, \infty\right) \Rightarrow x \in \left(1, 2\right] \text{ mathongo } \text{ matho$$

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

$$\frac{2}{x(x-2)} \le \frac{2}{x+2}$$

$$\frac{(x+2)-x(x-2)}{x(x-2)(x+2)} \le 0$$
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$$x(x-2)(x+2) = 3$$
 $(x-2)(x+2) = 3$ 
 $(x-2)(x+2) \le 0 \Rightarrow \frac{x^2-3x-2}{x(x-2)(x+2)} \ge 0$  mathongo // mathon

$$\begin{pmatrix} -2, \frac{3-\sqrt{17}}{2} \end{bmatrix} \cup \begin{pmatrix} 0, 2 \end{pmatrix} \cup \begin{bmatrix} \frac{3+\sqrt{17}}{2}, \infty \end{pmatrix}$$
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## **Basics**

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#### **Answer Kevs and Solutions**

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$$rac{x^2(3x-4)^3(x-2)^4}{(x-5)^5(2x-7)^6} \leq 0 \ \Rightarrow x = 0, rac{4}{3}, 2, 3x - 4 < 0, x - 5 > 0$$
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$$\Rightarrow x=0,rac{\pi}{3},2,3x-4<0,x-5>0$$
 or  $3x-4>0,x-5<0$ 

$$\left[\because x^2, (x-2)^4, (2x-7)^6 > 0
ight]$$
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$$\begin{bmatrix} x, (x-2), (2x-7) > 0 \end{bmatrix}$$

$$\Rightarrow x = 0, \frac{4}{3}, 2, \ x < \frac{4}{3}, \ x > 5 \text{ or } x \frac{4}{3}, \ x < 5$$

$$\Rightarrow x = 0, \frac{\pi}{3}, 2, x < \frac{\pi}{3}, x > 5$$
 or  $x = 0, 2$  and integral value between mathons with mathon with matho

$$\Rightarrow \log\left(rac{16}{15}
ight)^7 + \log\left(rac{25}{24}
ight)^5 + \log\left(rac{81}{80}
ight)^3$$
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Since bases of every logarithmic terms in addition are equal. So, we can follow the following property of logarithm-

$$\log_m(x) + \log_m(y) = \log_m(xy)$$
 So, by property of logarithm, we have  $\Rightarrow \log\left[\left(\frac{16}{15}\right)^7 \times \left(\frac{25}{24}\right)^5 \times \left(\frac{81}{80}\right)^3\right] = \log 2$ Hence,

required value is log 2. mathongo ///. mathongo ///. mathongo ///. mathongo ///. matho

7. (4) Here, 
$$5^{2\log_{10}x} = 5 + 4 \times 5^{\log_5 x^{\log_{10}5}} \left\{ \because a = b^{\log_b a} \right\}$$

$$= 5 + 4 \times 5^{\log_{10} 5^{\log_{5} x}} = 5 + 4 \times 5^{\log_{10} x}$$

**Note:** Our purpose was to write  $x^{\log_{10}(5)}$  in terms of an exponential with the common base 5.

$$\left(5^{\log_{10}x}\right)^2 - 4\left(5^{\log_{10}x}\right) - 5 = 0$$

$$\Rightarrow \left(5^{\log_{10}x} - 5\right)\left(5^{\log_{10}x} + 1\right) = 0$$
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But 
$$5^{\log_{10}x}+1\neq 0$$
  $\left(\because 5^{\log_{10}x}=+ve\right)$  mathongo we mathon which we mathon we will be a simple with a simple we will be a simple with a simple we will be a simple with a simple we will be a simple will be a simple we will be a simple with a simple we will be a simple with a simple we will be a simple we will be a simple with a simple will be a simple with a simple we will be

$$\therefore 5^{\log_{10} x} = 5$$
; or  $\log_{10} x = 1$   
Hence,  $x = 10$  /// mathongo /// mathongo /// mathongo /// mathongo ///

Hence, 
$$x=10$$

8. (2) 
$$abc + 1 = \frac{\log 12}{\log 24} \times \frac{\log 34}{\log 36} \times \frac{\log 36}{\log 48} + 1$$

$$= \frac{\log(48 \times 12)}{\log 48}$$
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$$= \frac{2 \log 24}{\log 48} = 2bc$$
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Hence, (B) is correct. athogo wathongo wath

$$egin{aligned} \mathbf{9.} & \log_x 2 \log_{2x} 2 = \log_{4x} 2 \ & \Rightarrow & (\log_x) \left(\log_2 2x 
ight) = \log_2 4x \end{aligned}$$

MoLet 
$$\log_{\tau} x = t$$
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$$\Rightarrow t^2 = 2$$
 mathongo  $= \pm \sqrt{2}$  mathongo  $= \pm$ 

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### **Answer Keys and Solutions**

10. (2) $\log_{10}(7x-9)^2 + \log_{10}(3x-4)^2 = 2$ muthongo $\Rightarrow (7x-9)^2(3x-4)^2 = (10)^2$	
Either $21x^2 - 55x + 46 = 0$ or $21x^2 - 55x + 26 = 0$ $21x^2 - 55x + 46 = 0$ has no real root.	
and $21x^2 - 55x + 26 = 0$ has 2 real roots  Hence, (B) is correct. The authorized Hence, (B) is correct.	