

Test (5)

Mr. D

1. The solution set of $6x^2 - 11x - 10 = 0$ is:

(a) $\left\{\frac{-5}{3}, 1\right\}$

(b) $\left\{\frac{5}{3}, -1\right\}$

(c) $\left\{\frac{-5}{2}, \frac{2}{3}\right\}$

(d) $\left\{\frac{5}{2}, \frac{-2}{3}\right\}$

① $6x^2 - 11x - 10 = 0$

$(2x - 5)(3x + 2) = 0$

$2x - 5 = 0$ or $3x + 2 = 0$

$x = \frac{5}{2}$

$x = -\frac{2}{3}$



$\left\{\frac{5}{2}, -\frac{2}{3}\right\}$

d

2. The solution set of $x^2 - 2 = |x|$ is:

(a) $\{2\}$

(b) $\{2, -1\}$

(c) $\{-2, 1\}$

(d) None of the previous

② $x^2 - 2 = |x|$

if $x \geq 0$

$$x^2 - 2 = x$$

$$x^2 - x - 2 = 0$$

$$(x - 2)(x + 1) = 0$$

$x = 2$ or $x = -1$
Rej.

if $x < 0$

$$x^2 - 2 = -x$$

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

$$(x + 2)(x - 1) = 0$$

$x = -2$ or $x = 1$
Rej.

$\{2, -2\} \rightarrow$ (d)

Remember

$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$

3. The solution set of the inequality $|7 - x| > 5$ is:

(a) $(-12, -2) \cup (0, \infty)$

(b) $(-\infty, 0) \cup (12, \infty)$

(c) $(-\infty, -12) \cup (-2, \infty)$

(d) $(-\infty, 2) \cup (12, \infty)$

③ $|7 - x| > 5$

$|x - 7| > 5$

$x - 7 > 5$ or $x - 7 < -5$

$x > 12$ or $x < 2$

$(12, \infty) \cup (-\infty, 2) \rightarrow \text{d}$

Remember
 $|a - b| = |b - a|$

4. The solution set of the inequality $\frac{(x+5)(x-2)}{x+3} > 0$ is:

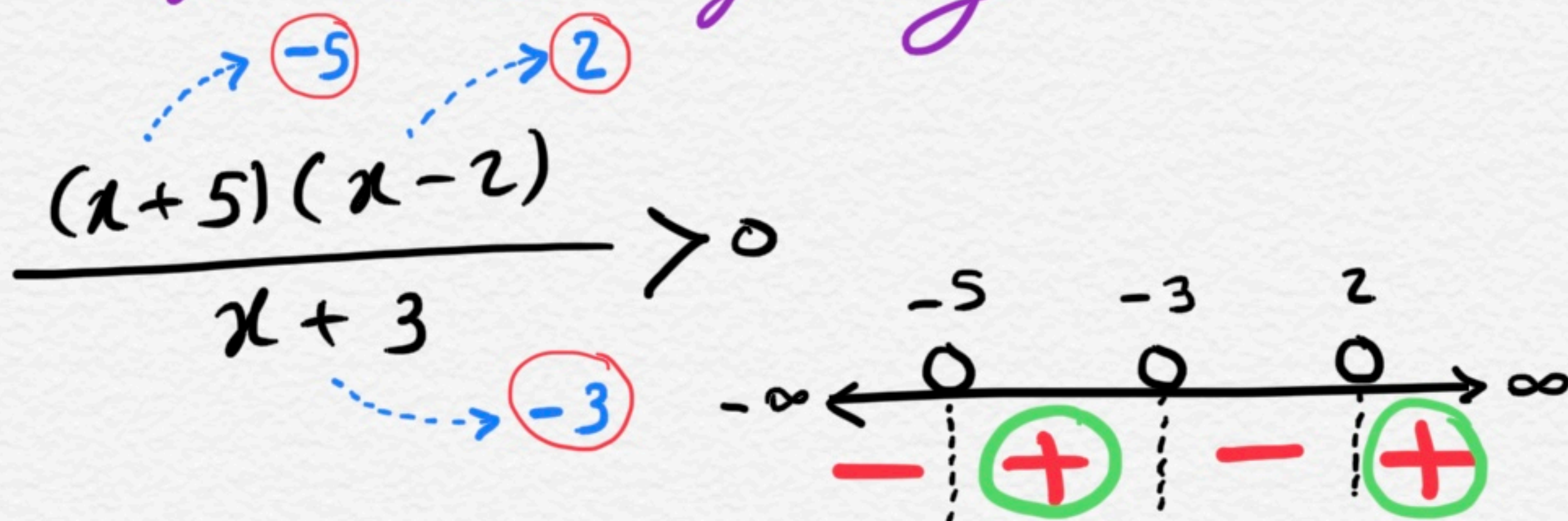
(a) $(-\infty, -3) \cup (2, \infty)$

(b) $(-\infty, -5) \cup (-3, \infty)$

(c) $(-\infty, -5) \cup (-3, 2)$

(d) $(-5, -3) \cup (2, \infty)$

④ It's rational inequality, we should use the no. line sign way.



$(-5, -3) \cup (2, \infty)$ → d

5. If $z = 2xw + 2yw + 2yx$, then $y =$

(a) $\frac{z - 2xw}{2w + 2x}$

(c) $\frac{z - 2xw}{2w - 2x}$

(b) $\frac{z - xw}{2xw}$

(d) $\frac{z - xw}{w - x}$

⑤ $z = 2xw + 2yw + 2yx$

$z - 2xw = 2yw + 2yx$

$z - 2xw = y(2w + 2x)$

$\frac{z - 2xw}{2w + 2x} = y$

So $y = \frac{z - 2xw}{2w + 2x} \rightarrow \textcircled{a}$

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

(a) $\frac{3x-4}{(x-1)(x-2)}$

(b) $\frac{x-4}{(x-1)(x-2)}$

(c) $\frac{x}{(x-1)(x-2)}$

(d) None of the previous

⑥

$$\frac{-1(x-2)}{(x-1)(x-2)} + \frac{2(x-1)}{(x-2)(x-1)}$$

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

$$= \frac{-x + \cancel{2} + 2x - \cancel{2}}{(x-1)(x-2)}$$

$$= \frac{x}{(x-1)(x-2)} \rightarrow \text{C}$$

7. $2x^3 - 5x^2 - 28x + 15 =$

(a) $(2x-1)(x-3)(x-5)$

(c) $(2x-1)(x-5)(x+3)$

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

(d) $x(2x-1)(x-5)(x+3)$

⑦ Option (a): is wrong, as when we expand it the last term will be -15

option (d): is wrong, as when we expand it the first term will be $2x^4$

the right answer will be either b or c

let's start expanding (b):

$$(2x^2 - 3)(x - 5) = 2x^3 + 10x^2 - 3x + 15 \quad \text{X}$$

So, the right answer is **C**

8. $\frac{5^{2x+1}}{5^{1-2x}} =$

- (a) 1
(b) 5^{4x}

- (c) 5^{4x-2}
(d) 25

⑧ $5^{(2x+1) - (1-2x)}$

$= 5^{2x+1-1+2x}$

$= 5^{4x} \rightarrow \textcircled{b}$

9. The solution set of $7^{x^2+20} = 7^{9x}$ is:

(a) $\{4, 5\}$

(c) $\{0, 20\}$

(b) $\{-4, -5\}$

(d) None of the previous

⑨ $7^{x^2+20} = 7^{9x} \longrightarrow x^2+20 = 9x$

$$x^2 - 9x + 20 = 0$$

$$(x-4)(x-5) = 0$$

$$x-4=0 \text{ or } x-5=0$$

$$x = 4$$

$$x = 5$$

\longrightarrow A

10. $\frac{2}{3} - \left(\frac{3}{4} - \frac{1}{2} \right) =$

(a) $\frac{5}{24}$

(b) $\frac{-7}{12}$

(c) $\frac{5}{12}$

(d) None of the previous

$$\textcircled{10} \quad \frac{2}{3} - \left(\frac{3}{4} - \frac{1 \times 2}{2 \times 2} \right)$$

$$= \frac{2}{3} - \left(\frac{3}{4} - \frac{2}{4} \right)$$

$$= \frac{2}{3} - \left(\frac{1}{4} \right)$$

$$= \frac{2 \times 4}{3 \times 4} - \frac{1 \times 3}{4 \times 3}$$

$$= \frac{8}{12} - \frac{3}{12} = \boxed{\frac{5}{12}} \rightarrow \textcircled{C}$$

11. The domain of $f(x) = \frac{1}{\sqrt{x-1}}$ is:

(a) $(-\infty, 1)$

(b) $\mathbb{R} \setminus \{1\}$

(c) $[1, \infty)$

(d) None of the previous

⑪ $x - 1 > 0$

$x > 1 \rightarrow (1, \infty) \rightarrow \textcircled{d}$

Normally we take what is inside the square root and make it ≥ 0 , but when the square root is in the denominator, we make it only > 0 , as the denominator can't be zero.

12. If $f(x) = x^2 - 1$, then $f(x-1) =$

(a) $x^2 + 2x - 1$

(b) $x^2 - 2x$

(c) $x^2 - 2x - 1$

(d) $x^2 - 2$

⑫
$$\begin{aligned} f(x-1) &= \underline{(x-1)^2 - 1} \\ &= \underline{x^2 - 2x + 1 - 1} \\ &= x^2 - 2x \rightarrow \textcircled{b} \end{aligned}$$

13. Prices in a sale were reduced by 20%. If the price of a washing machine was 120 KD before the sale, then its sale price is:

(a) 94 KD


(b) 144 KD

(c) 96 KD

(d) 100 KD

(13) Before discount : discount : After discount

%	100	:	20	:	80
KD	120	:		:	x



$$x = \frac{80 \cancel{\times} 120 \cancel{}}{100 \cancel{}} = 8 \times 12 = \text{KD } 96 \rightarrow \text{C}$$

14. During an operation, the heart beat of a patient has increased by 25%. He was given a medication that decreased the heart beat by 20% to reach 60 b/Min. The heart beat before the operation was:

- (a) 58 b/Min. (c) 64 b/Min.
(b) 72 b/Min. (d) None of the previous

(14) Let the original heart beat be 100

increased by 25% $\rightarrow 100 + 25 = \boxed{125}$

Reduce 125 by 20% $\rightarrow 125 - 20\% \text{ of } 125$

$$= 125 - \frac{20}{100} \times 125$$

$$= 125 - \frac{2 \times 125}{10} = 125 - \frac{250}{10} \\ = 125 - 25 = 100$$

So, the heart beats went back to its original value, then if it was 60, it will be 60.

(d)

15. If 5 rabbits consume 70 Kg of food per week, then how much food is consumed by 8 rabbits in 3 days?

(a) 72 Kg

(b) 48 Kg

(c) 24 Kg

(d) None of the previous

(15) In 1 week

Rabbits : food (kg)

$$\begin{array}{l} 5 : 70 \\ 8 : x \end{array}$$

$$\rightarrow x = \frac{8 \times \cancel{70}^{14}}{\cancel{5}_1}$$

$$x = 8 \times 14 = 112 \text{ Kg}$$

so, 8 rabbits consume 112 kg in 1 week

days : food (kg)

$$\begin{array}{l} 7 : 112 \\ 3 : y \end{array}$$

$$\rightarrow y = \frac{\cancel{112}^{16} \times 3}{\cancel{7}_1} = 16 \times 3$$

$$= 48 \text{ kg } \textcircled{b}$$

16. If 6 workers can finish a job in 8 days, then how many workers are needed to finish the same job in 4 days?

(a) 12

(b) 9

(c) 3

(d) None of the previous

①⑥ Number of workers and time are inversely proportional.

workers : days
6 : 8
 \longleftrightarrow
 x : 4

$$\rightarrow x = \frac{6 \times 8}{4}$$

$$x = \boxed{12} \rightarrow \text{A}$$

17. Ahmad can finish a job in 3 hours, while Mansour needs 9 hours to finish the same job. How long it takes to finish this job, if Ahmad and Mansour work together on it?

- (a) 2 hours
(b) 12 hours

- (c) 6 hours
(d) None of the previous

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$$\frac{1}{t_1} + \frac{1}{t_2} = \frac{1}{T}$$

$$\frac{1 \times 3}{3 \times 3} + \frac{1}{9} = \frac{1}{T}$$

$$\frac{3}{9} + \frac{1}{9} = \frac{1}{T}$$

$$\frac{4}{9} = \frac{1}{T} \rightarrow T = \frac{9}{4} h = 2 \frac{1}{4} h$$

2 h and 15 min.

d

t_1 : the time of the 1st worker alone

t_2 : the time of the 2nd worker alone

T : the time when both work together

18. A hotel charges x KD per night plus 8% tax applied to the room rate. The hotel also charges an untaxed 5 KD per stay in the hotel. How much would a guest pay if he stays for m nights?

(a) $1.08(mx + 5)$

(b) $(x + 0.08m) + 5$

(c) $1.08(mx) + 5$

(d) None of the previous

18 The room rate per day $= x + 8\% \text{ of } x = x + \frac{8}{100} \times x$

$$= x + 0.08x = 1.08x$$

For m days $\rightarrow 1.08x \times m + 5$

$$= 1.08mx + 5 \rightarrow \text{C}$$

19. A farm had 50 cows at the beginning of 2018. If it is estimated that the number of cows will double every 6 years, then which of the following will give the estimated number C of cows m years after 2018.

(a) $C = 50(2)^{6m}$

(c) $C = 50 + 6m$

(b) $C = 50(2)^{\frac{m}{6}}$

(d) $C = 6 + 50m$

19

$$T_{\text{total}} = P \left(1 + \frac{r}{100} \right)^t$$

Final amount original amount rate of yearly increasing time in years

$$C = 50 \left(1 + \frac{100}{100} \right)^t$$

$$C = 50 (1+1)^t$$

$$C = 50 (2)^t$$

doubling means increasing by 100%

Now, the time is t years if the increasing is happening yearly (once a year), but if it is faster like n times a year the time will be nt , if it's slower, like it happens once every n years, the time will be $\frac{t}{n}$

$$C = 50(2)^{\frac{m}{6}} \longrightarrow \text{b}$$

20. The cost (in KD) of producing m items in a factory is $C = 7m + 350$. The factory sells each item for 12 KD. What is the minimum number of items that must be sold for the factory to make profit?

(a) 84
(b) 70

(c) 71
(d) None of the previous

② profit = Revenue - Cost

$$\text{profit} = 12m - (7m + 350)$$

$$\text{profit} = 12m - 7m - 350$$

$$\text{profit} = 5m - 350$$

Think: when $m = 70 \rightarrow$ profit will be zero
($5(70) - 350 = 0$)

which means: selling less than 70 items \rightarrow loss

selling 70 items \rightarrow no profit

selling more than 70 items \rightarrow profit

So, the profit starts from the 71st item. (C)