CREST Olympiads

#CRESTInnovator

CREST Mathematics Olympiad (CMO)

Worksheet *for*

Class 8

Topic

Linear Equations in One Variable

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Worksheet on Linear Equations in One Variable

1. **The numerator of a fraction is 4 more than its denominator. If 3 is subtracted from the numerator and denominator both, the fraction becomes $1\frac{2}{5}$. What is the original fraction?**

   a. 11/13
   b. 13/11
   c. 13/17
   d. 17/13

2. **The difference between the squares of two consecutive numbers is 271. What are the numbers?**

   a. 115, 156
   b. 125, 146
   c. 135, 136
   d. 145, 126

3. **What is the value of 'a' from the linear equation (¼)(5y − 30) − (⅞)a = 0.25 if y = 1 + a?**

   a. -3
   b. 3
   c. -6
   d. 6

4. **An employee works in a telecommunication company on a contract of 30 days on the condition that he will receive $150 for each day he works and he will be fined $25 for each day if he is absent. How many days did he remain absent if he received $3275 in all?**

   a. 5 days
   b. 7 days
   c. 9 days
   d. 11 days

5. **There is a distance of 425 kilometres between two points P and Q. Two buses start simultaneously from P and Q towards each other and the distance between them after 3 hours is 173 km. If the speed of one bus is 7 km/h more than the speed of other buses, what is the speed of each bus?**

   a. 35.5 km/hr, 40.5 km/h
   b. 35.5 km/hr, 45.5 km/h
   c. 38.5 km/hr, 40.5 km/h
   d. 38.5 km/hr, 45.5 km/h

Answer Key

1. d - 17/13

Explanation: Let denominator (D) of the original fraction be x.
The numerator of a fraction is 4 more than its denominator.
Then numerator (N) be (x + 4).
Original fraction = N/D = $\frac{x+4}{x}$
If 3 is subtracted from the numerator and denominator both, the fraction becomes $1\frac{2}{5}$.
According to the question,

$$\Rightarrow \frac{x+4-3}{x-3} = 1\frac{2}{5}$$

$$\Rightarrow \frac{x+1}{x-3} = \frac{7}{5}$$

$$\Rightarrow 7(x-3) = 5(x+1)$$

$$\Rightarrow 7x-21 = 5x+5$$

$$\Rightarrow 7x-5x = 5+21$$

$$\Rightarrow 2x = 26$$

$$\Rightarrow x = 13$$

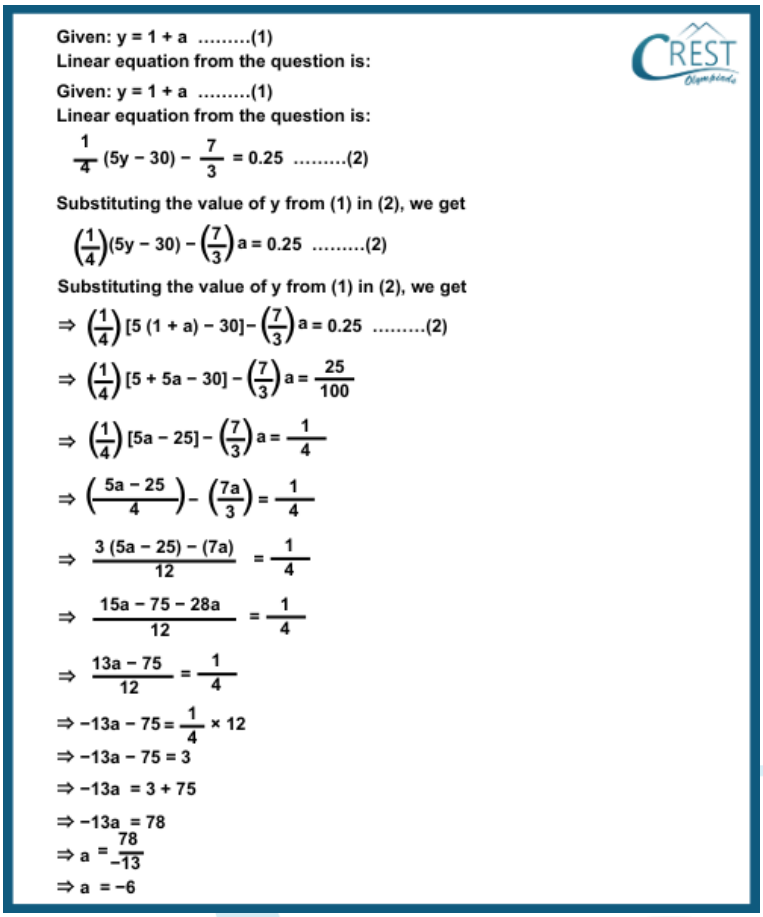
$$\text{Original fraction} = \frac{N}{D} = \frac{x+4}{x} = \frac{13+4}{13} = \frac{17}{13}$$

2. c - 135, 136

Explanation: Let two consecutive numbers be x and (x + 1).
The difference between the squares of two consecutive numbers is 271.
According to the question,
$(x + 1)^2 - x^2 = 271$
$\Rightarrow [(x + 1)(x + 1)] - x^2 = 271$
$\Rightarrow [x(x + 1) + 1(x + 1)] - x^2 = 271$
$\Rightarrow [x^2 + x + x + 1] - x^2 = 271$
$\Rightarrow [x^2 + 2x + 1] - x^2 = 271$
$\Rightarrow x^2 - x^2 + 2x + 1 = 271$
$\Rightarrow 2x + 1 = 271$
$\Rightarrow 2x = 271 - 1$
$\Rightarrow 2x = 270$
$\Rightarrow x = 270/2$
$\Rightarrow x = 135$
Numbers are: One number = x = 135
Another number = x + 1 = 135 + 1 = 136

3. c – (-6)

Explanation:



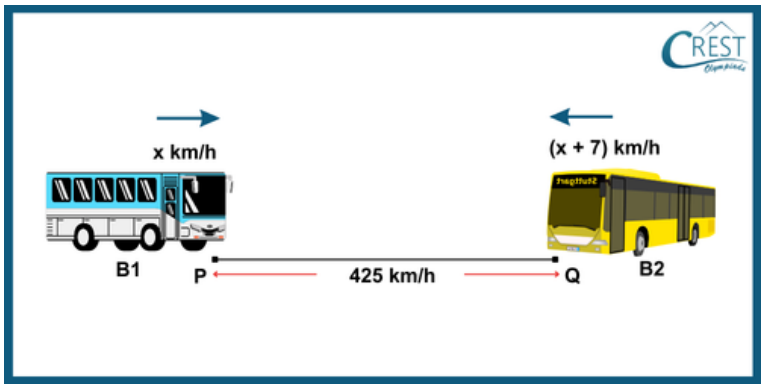
4. b - 7 days

Explanation: Number of days for the contract = 30 days
If an employee works a day, he will get per day = $150
If he is absent, he will be fined per day = $25
Let an employee remain absent for x days.
He worked for (30 − x) days.
Total money he earned = (30 − x) × 150
Total money he will be fined = x × 25
At the end of contract, he gets = $3275
According to the question,
[(30 − x) × 150] – [x × 25] = 3275
⇒ 4500 − 150x – 25x = 3275
⇒ 4500 − 175x = 3275
⇒ 4500 − 3275 = 175x
⇒ 1225 = 175x
⇒ x = 1225/175
⇒ x = 7

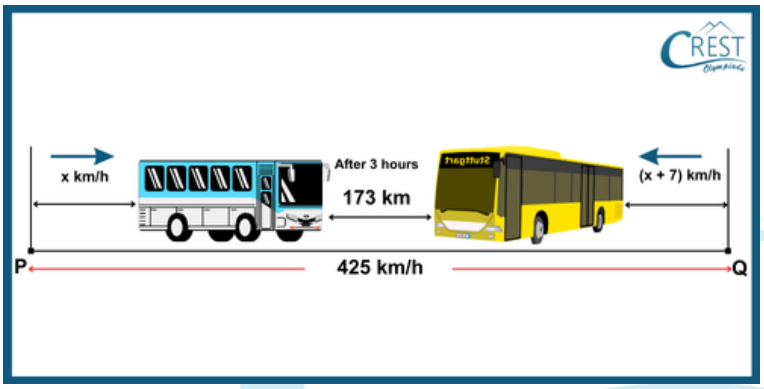
He remains absent for 7 days.

5. d - 38.5 km/hr, 45.5 km/h

Explanation: Distance between two places A and B = 425 km
Let the speed of bus B1 be x km/h.
Then, speed of bus B2 = (x + 7) km/h



After 3 hours, the distance between two buses is 173 km.



Total distance travelled by two buses after 3 hours = 425 − 173
⇒ [3 × x] + [3 × (x + 7)] = 425 − 173
⇒ [3x] + [3x + 21] = 252
⇒ 3x + 3x + 21 = 252
⇒ 6x = 252 − 21
⇒ x = 231/6
⇒ x = 38.5 km/hr
Speed of bus B1 = x km/h = 38.5 km/hr
Speed of bus B2 = (x + 7) km/h = (38.5 + 7) km/hr = 45.5 km/h

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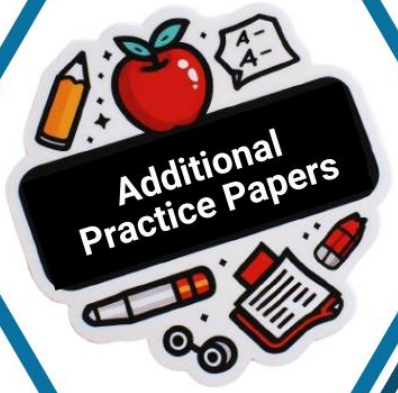

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