#CRESTInnovator

CREST Mathematics Olympiad (CMO)

Worksheet *for*

Class 8

Topic

Direct and Indirect Proportions

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Worksheet on Direct and Indirect Proportions

1. **A lamborghini car consumes 5.6 litres of petrol to travel a distance of 786 kilometres. How much distance will it cover in 8.4 litres of petrol?**

   a. 979 km
   b. 1079 km
   c. 1179 km
   d. 1279 km

2. **All the pipes used are of the same size. 17 pipes fill a cistern in 2 hours 22 minutes. How long will it take to fill the same cistern if 71 pipes are used?**

   a. 30 minutes
   b. 34 minutes
   c. 38 minutes
   d. 42 minutes

3. **Bosch takes 27 minutes to reach from town A to B if he goes by bus on a highway at a speed of 173.5 kilometres per hour. What should be his speed on a bicycle if he wants to cover the same distance in 5 hours and 47 minutes?**

   a. 7.5 km/h
   b. 9.5 km/h
   c. 11.5 km/h
   d. 13.5 km/h

4. **A contractor makes a contract to build an underground canal in the months of September and November and employs 75 labourers to work for 8 hours daily. After 35 days, he found that two-thirds of the total work was complete and a smaller amount was left. So, he decided to decrease some labour. How many labourers should be decreased by him to complete the remaining work in time if they work for 10 hours daily?**

   a. 31 labourers
   b. 33 labourers
   c. 35 labourers
   d. 37 labourers

5. **If 33 stallions consume 28 quintals of barley in 30 days, how long will one-fifth of barley last for 12 stallions?**

a. 6 ½ days
b. 16 ½ days
c. 26 ½ days
d. 36 ½ days

Answer Key

1. c - 1179 km

Explanation: According to the question,

Consumption of Petrol	5.6 Litres (x_1)	8.4 Litres (x_2)
Distance Covered	786 Kilometres (y_1)	y_2

If the consumption of petrol increases, then distance covered increases. Hence, a direct proportion relationship is established.
Using direct proportion formula,

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\Rightarrow \frac{5.6}{786} = \frac{8.4}{y_2}$$

$$\Rightarrow 5.6 \times y_2 = 8.4 \times 786$$

$$\Rightarrow y_2 = \frac{8.4 \times 786}{5.6}$$

$$\therefore y_2 = 1179$$

A distance of 1179 km will be covered in 8.4 litres of petrol.

2. b - 34 minutes

Explanation: A cistern means a tank for storing water.

According to the question,

Number of Pipes	17 pipes (x_1)	71 pipes (x_2)
Time to fill a Cistern	2 hours 22 minutes = 142 minutes (y_1)	y_2

If number of pipes increases, then time to fill a cistern decreases. Hence, an inverse proportion relationship is established.
Using inverse proportion formula,
$x_1 \times y_1 = x_2 \times y_2$
$\Rightarrow 17 \times 142 = 71 \times y_2$
$\Rightarrow y_2 = (17 \times 142)/71$
$\therefore y_2 = 34$
71 pipes can fill the same cistern in 34 minutes.

3. d - 13.5 km/h

Explanation: Time in minutes to reach from town A to B by bicycle
= 5 hours 47 minutes
= 5 hours + 47 minutes
= (5 × 60) minutes + 47 minutes
= 300 minutes + 47 minutes
= 347 minutes

Using unitary method,
To reach from town A to B in 27 minutes, speed = 173.5 km/h
If time to travel decreases, then speed increases. Thus, multiplication is performed.
To reach from town A to B in 1 minute, speed = (27 × 173.5) km/h
If time to travel increases, then speed decreases. Thus, division is performed.
To reach from town A to B in 347 minutes, speed = (27 × 173.5)/347
= 27/2
= 13.5 km/h

4. c - 33 labours

Explanation: The months of September and November have 30 days each.
According to the question,

M_1	75 labours	M_2	x labours
D_1	35 days	D_2	2 months − 35 days = (60 − 35) days = 25 days
T_1	8 hours	T_2	10 hours
W_1	$\frac{2}{3}$	W_2	$1 - \frac{2}{3} = \frac{1}{3}$ (Total work is taken as a whole i.e. 1)

Using time and work relationships,

$$\frac{M_1 \times D_1 \times T_1}{W_1} = \frac{M_2 \times D_2 \times T_2}{W_2}$$

$$\Rightarrow \frac{75 \times 35 \times 8}{\frac{2}{3}} = \frac{x \times 25 \times 10}{\frac{1}{3}}$$

$$\Rightarrow \frac{75 \times 35 \times 8 \times \frac{1}{3}}{\frac{2}{3} \times 25 \times 10} = x$$

$$\Rightarrow x = 42 \text{ labours}$$

42 labourers can complete the remaining work in time.
Number of labourers should be decreased by him to complete the remaining work
= 75 − 42 = 33 labours

5. b - 16 ½ days

Explanation: According to the question,

Number of stallions or horses	M_1	33 stallions	M_2	12 stallions
Time in days	T_1	30 days	T_2	x days
Quantity of barley in quintal	W_1	28 quintal	W_2	$\frac{1}{5} \times 28 = 5.6$ quintal

Using time and work relationships,

$$\frac{M_1 \times T_1}{W_1} = \frac{M_2 \times T_2}{W_2}$$

$$\Rightarrow \frac{33 \times 30}{28} = \frac{12 \times x}{5.6}$$

$$\Rightarrow x = \frac{33 \times 30 \times 5.6}{28 \times 12}$$

$$\Rightarrow x = \frac{33}{2}$$

$$\therefore x = 16\ \tfrac{1}{2} \text{ days}$$

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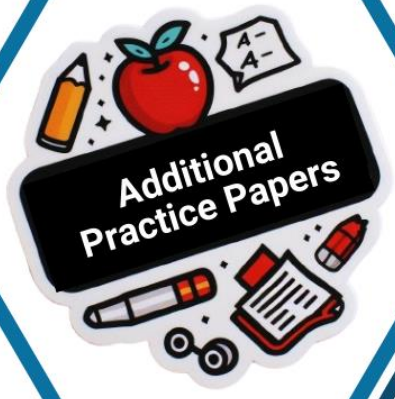

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