

# BHARAT SCHOOL OF BANKING

## PIPES AND CISTERN

### Question 1

Pipe A can fill a tank in 60 minutes and Pipe B can empty the tank in 120 minutes. How long will they take to fill the tank if both pipes are opened simultaneously ?

- a) 120 minutes    b) 30 minutes    c) 60 minutes    d) 45 minutes

**Answer: a) 120 minutes**

Solution:

Pipe A can fill in 1 hour (60 minutes) is  $\frac{1}{1}$  of the tank.

Pipe B can empty in 1 hour  $\frac{1}{2}$  of the tank [120 mins = 2hrs]

Both pipes together can fill the tank in 1 hour =  $\frac{1}{1} - \frac{1}{2} = \frac{1}{2}$  of the tank.

Since  $\frac{1}{2}$  part of the tank is filled in 1 hour, the remaining part left is  $\frac{1}{2}$  of the tank.

The remaining  $\frac{1}{2}$  part will be filled in other 1 hour.

So both the pipes take 2 hours (120 minutes) to fill the tank.

### Question 2

Pipe 1 and pipe 2 can fill a cistern in 2 and 6 hours respectively. Pipe 3 can empty the cistern in 9 hrs. If all the pipes are opened together find the time taken to full the cistern.

- a) 1.5 hrs    b) 1.4 hrs    c) 1.8 hrs    d) 1.6 hrs

**Answer: c) 1.8 hrs**

Solution :

Pipe 1 can fill  $\frac{1}{2}$  of the cistern in 1 hour

Pipe 2 can fill  $\frac{1}{6}$  of the cistern in 1 hour

Pipe 3 can empty  $\frac{1}{9}$  of the cistern in 1 hour

Time taken to full the cistern =  $\frac{1}{2} + \frac{1}{6} - \frac{1}{9} = \frac{5}{9}$

$\frac{5}{9}$  of the cistern will be filled in 1 hour.

Full cistern will be filled in  $\frac{9}{5} \times 1 = 1.8$  hours

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### Question 3

Two pipes P and Q can fill a cistern in 8 and 12 minutes respectively. Find the time taken to full the cistern if pipe Q is turned off after 4 minutes.

a) 5.3 minutes    b) 4.5 minutes    c) 5 minutes    d) 12 minutes.

**Answer : a) 5.3 minutes.**

Solution:

In 8 mins P can fill the cistern.

Therefore in 1 minute P can fill  $\frac{1}{8}$  of the cistern.

Similarly Q can fill  $\frac{1}{12}$  of the cistern in 1 minute

In 4 mins both the pipes can fill  $4(\frac{1}{8} + \frac{1}{12})$

$4(\frac{3+2}{24}) = \frac{5}{6}$  part of the cistern

The remaining part to be filled =  $1 - \frac{5}{6} = \frac{1}{6}$

Pipe P	Minutes
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$\frac{1}{8}$	1
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$\frac{1}{6}$	?
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$8 \times \frac{1}{6} = \frac{4}{3} = 1.3$  minutes.

Already P & Q opened together for 4 minutes and P alone for 1.3 minutes.

The total time taken to full the tank is  $4 + 1.3 = 5.3$  minutes.

### Question 4

A pipe P alone can fill a tank in 5 hours and pipe Q alone can fill the same tank in 10 hours. If both P and Q are opened together then find the time taken to fill the tank.

a) 2 hours    b)  $5 \frac{1}{5}$  hours    c)  $3 \frac{1}{3}$  hours    d) 4 hours

**Answer : c)  $3 \frac{1}{3}$  hours**

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Solution :

Pipe P can fill in one hour =  $1/5$

Pipe Q can fill in one hour =  $1/10$

Both the Pipe can fill in one hour =  $1/5 + 1/10 = 3/10$

Tank Filled    Time Taken

$3/10$                       1

1                      ?

=  $1/(10/3)$

Therefore both p and q together fill the tank in  $10/3$  hours.

i.e.,  $3 \frac{1}{3}$  hours.

### Question 5

Two pipes A and B Can fill a tank in 12 hours and 1 day respectively. A pipe C can empty the tank in 10 hours. If Pipe C is opened after 3 hours from the pipe A & B are opened, then find the time taken to full the tank.

a) 24 hours b) 28 hours c) 45 hours d) none of these

**Answer : b) 28 hours**

Solution :

The part of the tank filled in 1 hour =  $1/12 + 1/24$

Then, the part filled in 3 hours =  $3[1/12 + 1/24] = 3/8$

Remaining part to be filled =  $1 - 3/8 = 5/8$

Net part filled in 1 hour when A, B & C are opened =  $1/12 + 1/24 - 1/10 = 1/40$

Now,  $1/40$  part is filled in 1 hour then  $5/8$  part will be filled in  $[40 \times 5/8] = 25$  hours

Therefore,  $3/8$  part will be filled in 3 hours and  $5/8$  part filled in 25 hours.

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Hence the total time taken to full the tank is 28 hours.

### Question 6

Two taps P and Q fill a cistern in 2 days and 3 days respectively and another tap R empties the full cistern in 4 days. If all the taps P,Q and R switched simultaneously then the time taken to fill the cistern is:

a) 1 day +  $\frac{120}{7}$  hours b) 2 days +  $\frac{12}{7}$  hours c) 3 days +  $\frac{24}{7}$  hours d) 1 day +  $\frac{121}{7}$  hours

**Answer : a) 1 day +  $\frac{120}{7}$  hours**

Solution :

The tap P can fill a cistern in 1 hour =  $\frac{1}{48}$  part

The tap Q can fill a cistern in 1 hour =  $\frac{1}{72}$  part

The tap R can empty a cistern in 1 hour =  $\frac{1}{96}$  part

Then the net part filled in 1 hour =  $\frac{1}{48} + \frac{1}{72} - \frac{1}{96}$

=  $\frac{7}{288}$

Tank Filled	Time Taken
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$\frac{7}{288}$	1
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1	?
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The cistern will be filled in =  $\frac{288}{7}$

$\frac{288}{7}$  can be expressed as =  $(24 \times 7 + 120) / 7$  hours = 24  $\frac{120}{7}$  hours.

i.e., 1 day and  $\frac{120}{7}$  hours

### Question 7

Two taps can fill a cistern in 30 and 40 minutes respectively. If both the taps are opened simultaneously then the approximate time taken to fill the cistern is:

a) 17 minutes b) 12 minutes c) 19 minutes d) 21 minutes

**Answer : a) 17 minutes**

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Solution :

Remember the shortcut method:

"Two pipes A and B can fill (or empty) a tank in X and Y minutes respectively, while working alone. If both the pipes are opened together, then the time taken to fill (or empty) the cistern is given by  $\frac{XY}{X+Y}$  minutes."

Here, X = 30 minutes and Y = 40 minutes

Therefore, the required time =  $30 \times 40 / (30 + 40) = 1200/70 = 120/7 = 17 \frac{1}{7}$  minutes.

Hence the answer is 17 minutes (approximately)

### Question 8

A Pipe P can fill a tank in 16 minutes and the other pipe Q can empty the whole tank in 32 minutes. If both P and Q are opened simultaneously then the time taken to fill the tank is:

- a) 16 minutes    b) 32 minutes    c) 48 minutes    d) 40 minutes

**Answer : b) 32 minutes**

Solution :

Let X hours be the time taken to fill a tank by P.

Let Y hours be the time taken to empty the tank by Q.

Then the time taken to fill the tank when P and Q are switched together :  $\frac{XY}{Y-X}$  hours.

Here, X = 16 minutes And Y = 32 minutes

Therefore required time =  $16 \times 32 / (32 - 16) = 32 \times 16 / 16 = 32$  minutes.

### Question 9

Three taps A,B and C are used to fill a cistern. Tap A alone can fill the cistern in 9 minutes. Tap B can fill in 6 minutes and Tap C can fill in 3 minutes. How many minutes will it take to fill this cistern if all the three taps are used simultaneously?

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a)  $2\frac{3}{7}$     b)  $1\frac{7}{11}$     c)  $3\frac{2}{11}$     d)  $5\frac{6}{7}$

**Answer : b)  $1\frac{7}{11}$**

Solution :

Let the time taken to fill the cistern by 3 taps A, B and C be X, Y, and Z minutes respectively.

Then the short cut formula for,

Time taken to fill the tank when all the pipes are opened =  $\frac{XYZ}{(XY + YZ + ZX)}$  minutes

Here, X = 9 minutes, Y = 6 minutes and Z = 3 minutes.

Now the required time =  $\frac{(9)(6)(3)}{(9 \times 6) + (6 \times 3) + (3 \times 9)}$  minutes

$$= \frac{9 \times 6 \times 3}{54 + 18 + 27}$$

$$= \frac{9 \times 6 \times 3}{9\{6+2+3\}} = \frac{6 \times 3}{6+2+3} = \frac{18}{11} = 1 + \frac{7}{11} \text{ minutes}$$

Hence the answer is  $1\frac{7}{11}$  minutes.

### Question 10

Two taps X and Y filled a tank in 22 and 34 minutes respectively. If both X and Y are switched simultaneously then after how much time will the tank get filled?

a)  $11\frac{1}{14}$  minutes    b)  $9\frac{3}{14}$  minutes    c)  $13\frac{5}{14}$  minutes    d)  $8\frac{3}{14}$  minutes

**Answer : c)  $13\frac{5}{14}$  minutes**

Solution :

In these type of questions, we first find part of tank filled in 1 minute by both pipes then we add them to get the result.

Time taken by X to fill the tank = 22 minutes.

Then, part filled by X in 1 minute =  $\frac{1}{22}$

Time taken by Y to fill the tank = 34 minutes.

Then, part filled by Y in 1 minute =  $\frac{1}{34}$

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Net part filled by (X+Y) in 1 minute =  $\frac{1}{22} + \frac{1}{34} = \frac{(17+11)}{374} = \frac{28}{374} = \frac{14}{187}$ .

Time            Part of tank filled

1 minute         $\frac{14}{187}$

?                1 (here 1 denotes completely filled tank)

Time taken to fill the tank =  $\frac{187}{14} \times 1 = 13 \frac{5}{14}$  minutes.

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