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| **BOATS & STREAMS** |
| **Rule 1: If the speed of a boat (or the swimmer) in still water is x km/hr and if the speed of the stream is y km/hr, then, speed of the boat against the stream (i.e. upstream) = (x – y) km/hr.**  **Rule 2: Speed of a boat along the stream (i.e. downstream) = (x + y) km/hr** |
| **Rule 3: If a man rows in still water at x km/hr and the rate of current (or stream) is y km/hr, then man’s rate with the current (downstream) = (x + y) km/hr and**  **man’s rate against the current (upstream) = (x - y) km/hr.** |
| **Rule 4: Rate in still water = ½ (rate with the current + rate against the current)**  **Rate of current = ½(rate with the current – rate against the current)** |

1. **Speed of a man is 8 km/hr in still water. If the rate of current is 3 km/hr, find the speed of the man upstream?**

**Speed of the man upstream = 8 – 3 = 5 km/hr.**

**(Normally by speed of the boat or swimmer we mean the speed of the boat (or swimmer) in still water)**

1. **The speed of a boat in still water is 2 km/hr. If its speed upstream is 1 km/hr, then speed of the stream is:**

**1 = 2 – y implies y = 2 – 1 = 1 km/hr.**

1. **A boat goes 14 km upstream in 56 minutes. The speed of stream is 2 km/hr. The speed of boat in still water is:**

**We know that Speed = (Distance/Time)**

**Speed of the boat = 14 km/(56/60) hours = 14(60/56) = 15 km/hr**

**Then x – 2 = 15 (or) x = 17 km/hr**

1. **Speed of a swimmer is 8 km/hr in still water. If the rate of stream is 3 km/hr, find the speed of the swimmer downstream?**

**Speed of the swimmer downstream = 8 + 3 = 11 km/hr**

1. **The speed of a boat in still water is 10 km/hr. If the speed downstream is 13 km/hr, then speed of the stream is:**

**10 + y = 13 implies y = 13 – 10 = 3 km/hr**

1. **A man can row downstream at the rate of 14 km/hr and upstream at 5 km/hr. Find man’s rate in still water and the rate of current?**

**Rate in still water = ½(14 + 5) = 9.5 km/hr**

**Rate of current = ½( 14 – 5) = 4.5 km/hr**

1. **A man rows upstream 16 km and downstream 27 km taking 5 hours each time. What is the rate of current?**

**Man’s rate upstream = (16/5) km/hr**

**Man’s rate downstream = (27/5) km/hr**

**Rate of current = ½[(27/5) – (16/5)] = ½ (5.4 – 3.2) = (2.2/2) = 1.1 km/hr**

1. **A boat moves downstream at the rate of 1 km in 6 minutes and upstream at the rate of 1 km in 10 minutes. Find the speed of the current?**

**Speed downstream = (1/6) km/min = 10 km/hr**

**Speed upstream = (1/10) km/min = 6 km/hr**

**Speed of the current = ½(speed downstream – speed upstream) = ½(10 – 6) = 2 km/hr**

1. **The speed of a boat in still water is 15 km/hr. and the rate of current is 3 km/hr. Find the distance travelled downstream in 12 minutes?**

**Speed downstream = 15 + 3 = 18 km/hr**

**Distance travelled in 12 minutes = (12/60)(18) = 3.6 km**

1. **The speed of a boat in still water is 12 km/hr. Going downstream it moves at the rate of 19 km/hr. The speed of the boat against the stream is …………..**

**½ (x + 19) = 12 or x = 24 – 19 = 5 km/hr**

1. **If a man rows at the rate of 5 km/hr in still water and his rate against the current is 3.5 km/hr, then the man’s rate along the current is:**

**½ (x + 3.5) = 5 or x = 10 – 3.5 = 6.5 km/hr**

1. **If a man’s downstream rate is 10 km/hr and the rate of stream is 1.5 km/hr, then the man’s upstream rate is:**

**Rate of stream = ½ (downstream rate – upstream rate)**

**Or 1.5 = ½ (10 – x) or x = 7 km/hr**

1. **If a man rows at 8 km/hr in still water and his upstream rate is 5 km/hr, then the man’s rate along the current (downstream) is:**

**Man’s rate in still water = ½ (downstream rate + upstream rate)**

**8 = ½ (5 + x) or x = 11 km/hr**

1. **A person rows a kilometer down the stream in 10 minutes and upstream in 30 minutes. Find the rate of stream?**

**Rate downstream = (1/10) 60 = 6 km/hr**

**Rate upstream = (1/30) 60 = 2 km/hr**

**Rate of stream = ½ (6 – 2) = 2 km/hr**

1. **A man takes twice as long to row up as to row down the river. If the rate of river is 4 km/hr, find the rate of the man in still water?**

**Let rate of man in still water be x km/hr.**

**Then x + 4 = 2(x – 4) or x = 12 km/hr**

1. **A man can row upstream 32 km in 4 hours. If the speed of current is 2 km/hr, find how much he can go downstream in 6 hours?**

**Downstream rate = (32/4) = 8 km/hr**

**Speed of man in still water = 8 + 2 = 10 km/hr**

**Now required distance = (10 + 2)6 = 72 km**