Piecewise practical models where relevant

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. A fee is 8 dollars for $0 < t \leq 2$ h, then $8 + 4(t - 2)$ for $t > 2$. Find the fee at 5 h. [2 marks]

$8 + 4(5 - 2) = 20$.

Answer: 20 dollars.

2. A fee is 8 dollars for $0 < t \leq 2$ h, then $8 + 4(t - 2)$ for $t > 2$. Find the charge at exactly 2 h. [2 marks]

The first interval includes 2.

The second expression also approaches 8 there.

Answer: 8 dollars.

3. Water costs 2 dollars/kL for the first 10 kL and 3 dollars/kL above 10. Write its rule for $u > 10$. [2 marks]

First-band charge is $2(10) = 20$.

Only excess usage is charged at 3 dollars/kL.

Answer: $C = 20 + 3(u - 10)$.

4. Water costs 2 dollars/kL for the first 10 kL, then 3 dollars/kL above 10. Find the bill for 14 kL. [2 marks]

$20 + 3(14 - 10) = 32$.

Answer: 32 dollars.

5. A parcel fee is 5 dollars for $0 < m \leq 1$ kg and 9 dollars for $1 < m \leq 2$ kg. Find fees at 1 kg and 1.1 kg. [2 marks]

1 is in the first band; 1.1 is in the second.

Answer: 5 dollars; 9 dollars.

6. A proposed rule gives $C = 4t$ for $0 \leq t \leq 2$ and $C = 3t + 1$ for $t \geq 2$. What is wrong? [3 marks]

Both intervals include 2.

The formulas disagree, so the rule is not a function.

Answer: It assigns both 8 and 7 dollars at $t = 2$.