

Exercise walk-through

3.1.3

Proportion Models

AQA · GCSE · Mathematics

16. Ratios, equivalent proportions and mixtures · Foundation

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For 700 ml at 2:5, each part is 100 ml: concentrate 200 ml and water 500 ml. Concentrate:whole=2:7, while concentrate/water=2/5. Water/concentrate=5/2, a fraction greater than 1. Doubling both gives 400:1000=2:5. If concentrate is x and water y , the recipe requires $y=(5/2)x$, a straight line through the origin. For 300 ml concentrate, water is 750 ml and the total is 1050 ml. A batch with 200 ml concentrate and 600 ml water has ratio 1:3 and is weaker. To simplify 1.5 litres:500 ml, first write $1500:500=3:1$.

31. Direct and inverse proportional relationships · Higher

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Direct proportion $y=kx$ preserves y/x for nonzero x and gives a straight line through the origin. Inverse proportion $y=k/x$ preserves xy and gives a reciprocal curve, with $x=0$ excluded. State the fixed assumptions: a start-up charge breaks direct proportion, while changing productivity can break inverse proportion. Higher constructs the equation from a known pair; Foundation interprets and uses a given equation.

33. Direct and inverse proportional relationships · Higher

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For a given fabric cost $C=3L$, lengths 2,4,6 m cost 6,12,18 yuan: $C/L=3$. A 5-yuan fixed fee instead gives $C=5+3L$, which is linear but not directly proportional. For a given fixed-job model $t=24/w$, workers 2,4,6 need 12,6,4 hours, and $wt=24$ worker-hours. Doubling workers halves time. Higher construction: if y is directly proportional to x and $y=18$ at $x=6$, $k=18/6=3$, hence $y=3x$. If t is inversely proportional to w and $t=6$ at $w=4$, $k=tw=24$, hence $t=24/w$. These models assume a constant rate and exclude impossible negative worker counts.

Exercises 2.1·2.3

2.1 (Foundation) Use $C=3L$ to find C for $L=6$.

2.2 (Foundation) Use $t=24/w$ to find t for $w=4$.

2.3 (Foundation) Find the constant product wt for this inverse model.

Exercises 2.1·2.3

2.1 (Foundation) Use $C=3L$ to find C for $L=6$.

2.1 Substitute $L=6$: $C=18$.

2.2 (Foundation) Use $t=24/w$ to find t for $w=4$.

2.2 Substitute $w=4$: $t=24/4=6$ hours.

2.3 (Foundation) Find the constant product wt for this inverse model.

2.3 Multiply: $w \times (24/w) = 24$ for $w \neq 0$.

Exercise 3.1

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3.1 False. $y=2x+3$ is straight but does not pass through the origin: $y(0)=3$. Direct proportion requires $y=kx$ and a constant quotient for nonzero x .

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.