

Linear Relations Review

Answer key Final answers only. Try first, then check.

CORE SKILLS

- K1**
- a) Linear (first differences all -3); partial variation; $y = -3x + 1$
 - b) Not linear: first differences 1, 3, 5, 7 are not constant
 - c) Linear (first differences all 6 for an x step of 3); direct variation; $y = 2x$

- K2**
- a) $m = -\frac{3}{4}$
 - b) 0; undefined
 - c) $m = \frac{5}{2}$

- K3**
- a) $m = -3, b = 7$
 - b) $m = \frac{1}{2}, b = -4$
 - c) $y = \frac{1}{2}x - 2$

- K4**
- a) $y = -3x + 5$
 - b) $y = -\frac{3}{2}x + 4$
 - c) $y = \frac{3}{4}x - 3; m = \frac{3}{4}, b = -3$

- K5**
- a) Parallel: $-\frac{2}{5}$; perpendicular: $\frac{5}{2}$
 - b) $y = -\frac{1}{4}x + 3$
 - c) Parallel: $y = 2$; perpendicular: $x = -3$

REAL WORLD

- A1**
- a) -1.5 cm per day: the ice gets 1.5 cm thinner each day
 - b) $T = 36 - 1.5d$; 14 days (March 29)
 - c) Nothing real: a thickness can't be negative. The ice is gone at $d = 24$, so the model only applies for $0 \leq d \leq 24$.
- A2**
- a) The rate is $\frac{4}{2} = \frac{6}{3} = \frac{6}{3} = 2$ dollars per kg in every interval; $C = 2m + 9$
 - b) \$2 per kilogram; \$9 fixed fee per parcel; \$39
 - c) $2m + 9 = 75$ gives $m = 33$, which is over the limit, so 30 kg (cost \$69)
- A3**
- a) $3p + 2d \geq 600$; solid
 - b) No: $\$590 < \$600$. Yes: exactly \$600
 - c) No: the class can't sell -30 drinks. $p \geq 0$ and $d \geq 0$, and both must be whole numbers.

THINK IT THROUGH

- T1**
- a) $0 > 6$ is false, so not a solution; but $0 > -3$ is true, so it is in the student's region
 - b) Dividing by -2 must flip the sign, and $>$ needs a dashed line. $y < 2x - 3$: dashed line, shade below it.
 - c) No: $8 - 2 = 6$, and $6 > 6$ is false. The point lies on the dashed boundary line, which is not part of the solution.
- T2**
- a) $m_{AB} = \frac{1}{2}, m_{BC} = -2$, and $\frac{1}{2} \times (-2) = -1$
 - b) $D(-2, -1); y = \frac{1}{2}x$
 - c) e.g. $y = -\frac{1}{2}x + \frac{7}{2}$ passes through B and has slope $-\frac{1}{2}; \frac{1}{2} \times \left(-\frac{1}{2}\right) = -\frac{1}{4} \neq -1$, so it is not perpendicular to AB .

BOSS LEVEL

- Boss**
- a) $k = 5$ or $k = -3$
 - b) $k = 5: y = 2x - 1; k = -3: y = -2x + 3$
 - c) $\frac{1}{2}$ square unit
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