

Analytic Geometry Review

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

CORE SKILLS

- K1**
- a) $(1, 1)$
 - b) $\sqrt{80} = 4\sqrt{5}$
 - c) $Q(8, -5)$
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- K2**
- a) $r = 3\sqrt{5} \approx 6.7$; intercepts $(3\sqrt{5}, 0)$, $(-3\sqrt{5}, 0)$, $(0, 3\sqrt{5})$, $(0, -3\sqrt{5})$
 - b) $x^2 + y^2 = 169$
 - c) $(6, -3)$: on (45); $(-4, 5)$: inside (41); $(5, 5)$: outside (50)
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- K3**
- a) $AB = 2\sqrt{5}$, $BC = 2\sqrt{5}$, $AC = 2\sqrt{10}$
 - b) $m_{AB} = \frac{1}{2}$, $m_{BC} = -2$, $m_{AC} = -\frac{1}{3}$
 - c) Isosceles right triangle: $AB = BC$, and $m_{AB} \cdot m_{BC} = -1$, so the right angle is at B .
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- K4**
- a) $y = 2x + 2$
 - b) $y = -2x + 10$
 - c) $y = -2x + 2$
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- K5**
- a) $y = -\frac{1}{2}x + 2$
 - b) $(2, 1)$
 - c) $2\sqrt{5} \approx 4.5$ units

REAL WORLD

- A1**
- a) $x^2 + y^2 = 169$
 - b) $(5, -12)$: exactly 13 km away, on the edge of coverage. $(-9, 10)$: $\sqrt{181} \approx 13.5$ km away, no coverage.
 - c) 12 km. $x^2 + 25 = 169$ gives $x = \pm 12$, but the road only has $x \geq 0$, so $x = -12$ is not on it.
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- A2**
- a) $y = \frac{1}{2}x + 2$; $(4, 4)$
 - b) $3\sqrt{5}$ units ≈ 67.1 m
 - c) 50 m. The perpendicular from G meets the road's line at $(10, 7)$, past the gate, so the shortest driveway goes to E : $GE = 5$ units. (The perpendicular distance, ≈ 44.7 m, cannot be reached.)
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- A3**
- a) $(0, -2)$
 - b) $2\sqrt{10}$ units ≈ 63.2 m
 - c) No: $(0, -2)$ is 20 m south of side AB , outside the park, because the angle at C is obtuse. That point is the only one equidistant from all three corners, so no spot inside the park works; the plan needs to change.

THINK IT THROUGH

- T1**
- a) $m_{PQ} = \frac{3}{4}$, $m_{QR} = -\frac{3}{4}$; product $-\frac{9}{16} \neq -1$, so the angle at Q is not right: not a square.
 - b) Rhombus. Diagonals PR (on $y = 0$) and QS (on $x = 1$) are perpendicular and bisect each other at $(1, 0)$; they have different lengths, 8 and 6.
 - c) $Q(1, 4)$ and $S(1, -4)$
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- T2**
- a) $M(b, c)$, $N(a + b, c)$
 - b) $m_{MN} = \frac{c-c}{a} = 0 = m_{OA}$, so $MN \parallel OA$; $MN = a$ and $OA = 2a$.
 - c) One example shows the property for that triangle only. Any triangle can be placed with one vertex at the origin and one side along the positive x -axis, so $O(0, 0)$, $A(2a, 0)$, $B(2b, 2c)$ with any $a > 0$, $c > 0$ and any b describes every triangle.

BOSS LEVEL

- Boss** **a)** 12 points: $(\pm 5, 0)$, $(0, \pm 5)$, $(\pm 3, \pm 4)$, $(\pm 4, \pm 3)$
 b) 16: $(\pm 1, \pm 8)$, $(\pm 8, \pm 1)$, $(\pm 4, \pm 7)$, $(\pm 7, \pm 4)$
 c) 29
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