Geometry Unit 1 worksheet: Points, lines and planes

Name _____ Date _____ Period _____

1. Say whether each word is an undefined term or a defined term. For each defined term, name the undefined terms its definition is built on: (a) plane, (b) collinear, (c) segment, (d) point, (e) coplanar.

2. Use the slope test to decide whether the three points are collinear.

(a) $(-4, 9), (0, 3), (6, -6)$

(b) $(-1, -5), (2, 1), (8, 12)$

(c) $(3, 8), (3, -2), (5, 4)$

(d) $(-6, -2), (-2, 1), (10, 10)$

(e) $(0, -4), (5, 0), (-10, -11)$

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3. Line t passes through points P, Q and R. Point S is not on t. All four points lie in plane $\mathcal{K}$. Say whether each is a correct name. If it is not, say why.

(a) $\overleftrightarrow{RP}$ for line t

(b) $\overline{PQ}$ for line t

(c) $\overleftrightarrow{QS}$ for line t

(d) plane QSR for plane $\mathcal{K}$

(e) plane PQR for plane $\mathcal{K}$

4. Elena's hiking map marks four campsites P, Q, R and S, and lists the straight-line distances between some of them, in kilometers: $PQ = 9$, $QR = 14$, $PR = 5$, $PS = 6$ and $QS = 4$.

(a) Do P, Q and R lie on one straight line? If they do, which campsite lies between the other two?

(b) Do P, Q and S lie on one straight line? Explain.

(c) A fifth campsite T lies on $\overline{QR}$ with $PT = 3$ and T between P and R. Find QT and TR.

5. Let a and b be any numbers that are not 0.

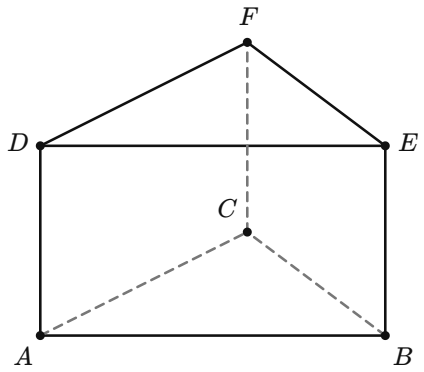
(a) Show that the points $(a, 0)$, $(0, b)$ and $(2a, -b)$ are collinear, whatever a and b are.

(b) Find the number c for which $(a, 0)$, $(0, b)$ and $(3a, cb)$ are collinear for every such a and b.

6. Hannah is putting up a straight fence across a garden. On a plan marked in meters, the first two posts stand at $(-1, -3)$ and $(3, -2)$. The last post must stand where $x = 15$, in line with the first two. Find the y-coordinate of the last post.

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7. The figure shows a triangular prism. Its bottom face is triangle ABC and its top face is triangle DEF, with D directly above A, E above B and F above C.



(a) Are A, B and F coplanar? Explain.

(b) Are A, C, D and E coplanar? Explain.

(c) Name the one other labeled point that is coplanar with B, C and E.

8. Use only these rules.

- **Rule 1.** Through any two different points there is exactly one line.
- **Rule 2.** Every line contains at least two points.
- **Rule 3.** There are three points that do not all lie on one line.

Given: a line ℓ and a point P that is not on ℓ. Prove that at least two different lines pass through P and meet ℓ.

Statements	Reasons

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