Geometry Unit 1 worksheet: Lines and planes in space

Name _____ Date _____ Period _____

1. Find every point the two lines share. If they share no point, or are the same line, say so and explain how you know.

(a) $y = 3x + 2$ and $y = -x - 6$

(b) $x + y = 10$ and $y = x - 4$

(c) $y = -3x + 4$ and $6x + 2y = 8$

(d) $2x - y = 5$ and $y = 2x + 1$

(e) $y = \frac{1}{2}x + 3$ and $y = -2x - 2$

(f) $x = 4$ and $y = -2x + 5$

2. A fish tank is a glass box with no lid. It is 40 cm long, 35 cm wide and 40 cm tall. A plastic strip covers every edge of the tank, including the four edges around the open top, and water fills it to a depth of 30 cm.

Find (a) the length of the strip, (b) the area of the glass, and (c) the volume of the water. For each, give the dimension of the figure being measured.

3. On a city map every street is drawn as a straight line. 3 streets run north to south, 2 run east to west, and 4 run diagonally from southwest to northeast. Streets that run the same way are parallel, and no three streets pass through one point. At how many points do two streets cross?

4. A straight escalator runs from a point A on a balcony, 4 m above the ground floor of a mall, down through an opening in the floor to a point B in the basement. Treat the ground floor as a plane. The escalator is 20 m long and passes through the floor 8 m from A. How far below the ground floor is B?

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5. Decide whether each statement is always, sometimes or never true. For "sometimes", give one case where it is true and one where it is false.

(a) Two different lines that meet at a point lie in one plane.

(b) Three different lines that all pass through one point lie in one plane.

(c) Two lines that are each parallel to the same plane are parallel to each other.

(d) Three different planes that share two different points share a whole line.

(e) Two lines that are each skew to a third line are skew to each other.

(f) A line that lies in one of two parallel planes meets a line that lies in the other.

6. A prism has a regular hexagon $ABCDEF$ for its bottom and a regular hexagon $A'B'C'D'E'F'$ for its top, with A' straight above A, B' above B, and so on. It has 18 edges. Sort the other 17 edges into three groups: those whose lines intersect $\overleftrightarrow{AB}$, those parallel to it, and those skew to it. Explain each group. (A sketch helps.)

7. Planes P and Q meet in line ℓ. Point A is in P but not on ℓ, and point B is in Q but not on ℓ.

(a) Explain why $\overleftrightarrow{AB}$ does not lie in P.

(b) Explain why $\overleftrightarrow{AB}$ and ℓ are skew.

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