## Unit 6 Lesson 17: Lines in Triangles

### 1 Folding Altitudes (Warm up)

#### Student Task Statement

Draw a triangle on tracing paper. Fold the altitude from each vertex.

### 2 Altitude Attributes

#### Student Task Statement

Triangle $ABC$ is graphed.



1. Find the slope of each side of the triangle.
2. Find the slope of each altitude of the triangle.
3. Sketch the altitudes. Label the point of intersection $H$.
4. Write equations for all 3 altitudes.
5. Use the equations to find the coordinates of $H$ and verify algebraically that the altitudes all intersect at $H$.

### 3 Percolating on Perpendicular Bisectors (Optional)

#### Student Task Statement

Triangle $ABC$ is graphed.



1. Find the midpoint of each side of the triangle.
2. Sketch the perpendicular bisectors, using an index card to help draw 90 degree angles. Label the intersection point $P$.
3. Write equations for all 3 perpendicular bisectors.
4. Use the equations to find the coordinates of $P$ and verify algebraically that the perpendicular bisectors all intersect at $P$.

### 4 Perks of Perpendicular Bisectors (Optional)

#### Student Task Statement

Consider triangle $ABC$ from an earlier activity.

1. What is the distance from $A$ to $P$, the intersection point of the perpendicular bisectors of the triangle’s sides? Round to the nearest tenth.
2. Write the equation of a circle with center $P$ and radius $AP$.
3. Construct the circle. What do you notice?
4. Verify your hypothesis algebraically.

### 5 Amazing Points (Optional)

#### Student Task Statement

Consider triangle $ABC$ from earlier activities.



1. Plot point $H$, the intersection point of the altitudes.
2. Plot point $P$, the intersection point of the perpendicular bisectors.
3. Find the point where the 3 medians of the triangle intersect. Plot this point and label it $J$.
4. What seems to be true about points $H,P,$ and $J$? Prove that your observation is true.

### 6 Tiling the (Coordinate) Plane (Optional)

#### Student Task Statement

A tessellation covers the entire plane with shapes that do not overlap or leave gaps.

1. Tile the plane with congruent rectangles:
	1. Draw the rectangles on your grid.
	2. Write the equations for lines that outline 1 rectangle.
2. Tile the plane with congruent right triangles:
	1. Draw the right triangles on your grid.
	2. Write the equations for lines that outline 1 right triangle.
3. Tile the plane with any other shapes:
	1. Draw the shapes on your grid.
	2. Write the equations for lines that outline 1 of the shapes.



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