

MASSACHUSETTS MATHEMATICS LEAGUE
NOVEMBER 2003
ROUND 6: GEOMETRY ANGLES

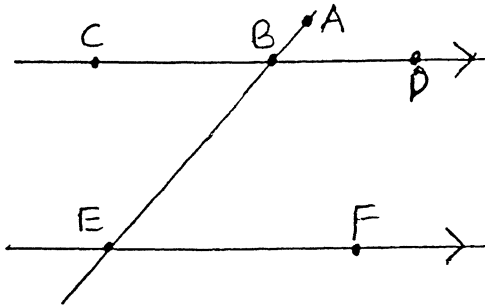
ANSWERS

A) 132°

B) 78°

C) 15

A) Given two parallel lines cut by a transversal. If $\angle ABC = 6x + 6y - 36$, $\angle CBE = 4x$, and $\angle BEF = 3y$; calculate the degree measure of $\angle DBE$.



$$6x + 6y - 36 + 4x = 180$$

$$10x + 6y = 216$$

$$x = 12$$

$$5x + 3y = 108$$

$$4x = 48^\circ$$

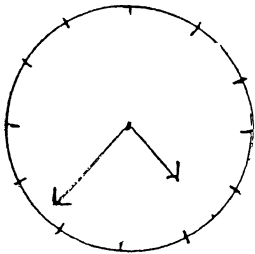
$$4x - 3y = 0$$

$$\angle DBE = 180^\circ - 48^\circ$$

$$9x = 108$$

$$= 132^\circ$$

B) What is the smaller angle formed by the hands of a clock at 4:36?

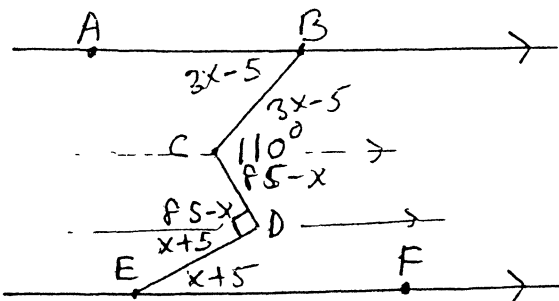


$$\text{min hand } \frac{36}{60} \cdot \frac{360^\circ}{1} = 216^\circ$$

$$\text{hour hand } 120^\circ + \frac{3}{5} \cdot \frac{30}{1} = 138^\circ$$

$$216^\circ - 138^\circ = 78^\circ$$

C) Given two parallel lines. If $\angle ABC = 3x - 5$, $\angle BCD = 110^\circ$, $\angle CDE = 90^\circ$, and $\angle DEF = x + 5$; calculate the value of x .



$$3x - 5 + 85 - x = 110^\circ$$

$$2x + 80^\circ = 110^\circ$$

$$2x = 30^\circ$$

$$x = 15$$