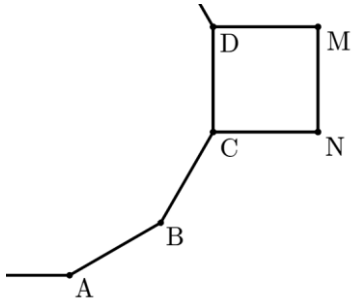
a)

AB, BC and CD are sides of a regular 12-sided polygon.
CDMN is a square.

Prove that the points A, B and N lie on a straight line.

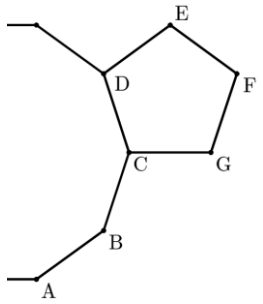


What would make ABN a straight line?	ABN would be a straight line if the angles CBA and NBC sum to 180 degrees.
What is the size of angle CBA?	$\frac{360}{12} = 30°$ (exterior angle) $CBA = 180 - 30 = 150°$
What is the size of angle NBC?	$BCD = CBA = 150°$ (regular polygon) $NCD = 90°$ (square) $BCN = 360 - (150 + 90) = 120°$ $NBC = \frac{180-120}{2} = 30°$
What is the sum of CBA and NBC?	$150 + 30 = 180$ Because the angles CBA and NBC have a sum of 180°, ABN is a straight line.

b)

AB, BC and CD are sides of a regular 10-sided polygon.
CDEFG is a regular pentagon.

Prove that the points A, B and G lie on a straight line.

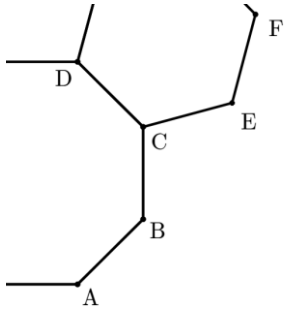


What would make ABG a straight line?	ABG would be a straight line if the angles CBA and GBC sum to 180 degrees.
What is the size of angle CBA?	$\frac{360}{10} = 36°$ (exterior angle) $CBA = 180 - 36 = 144°$
What is the size of angle GBC?	$BCD = CBA = 144°$ (regular polygon) $NCD = 180 - \frac{360}{5} = 108°$ (regular pentagon) $GCB = 360 - (144 + 108) = 108°$ $GBC = \frac{180-108}{2} = 36°$
What is the sum of CBA and GBC?	

c)

AB, BC and CD are sides of a regular octagon.
CD, CE and EF are sides of a regular hexagon.

Determine whether A, B and E lie on a straight line.



What would make ABE a straight line?	ABE would be a straight line if the angles CBA and EBC sum to 180 degrees.
What is the size of angle CBA?	$\frac{360}{8} = 45°$ (exterior angle) $CBA = 180 - 45 = 135°$
What is the size of angle GBC?	
What is the sum of CBA and GBC?	

d)

AB, BC and CD are sides of a regular octagon.
CD, EF and FG are sides of a different regular octagon.

Determine whether A, B and E lie on a straight line.