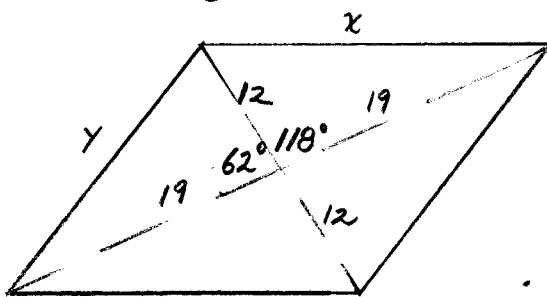


Lesson 8 – Vectors Application Questions (Bearing and Course)

Note: This is all “grade 10” material.

1. The diagonals of a parallelogram are 24 cm and 38 cm long respectively. If the measure of the angle between the diagonals is 62 degrees, find the perimeter of the parallelogram to the nearest tenth.

Diagonals bisect in a parallelogram.



$$x^2 = 12^2 + 19^2 - 2(12)(19)\cos 118^\circ$$

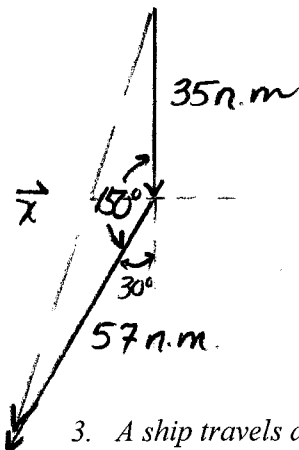
$$x = \underline{26.82 \text{ cm}}$$

$$y^2 = 12^2 + 19^2 - 2(12)(19)\cos 62^\circ$$

$$y = \underline{17.06 \text{ cm}}$$

$$\therefore P = (26.82 + 17.06)2 = \underline{87.8 \text{ cm}}$$

2. A ship travels due south for 35 nautical miles then travels  $S30^\circ W$  for 57 nautical miles. How far is the ship from its starting point?

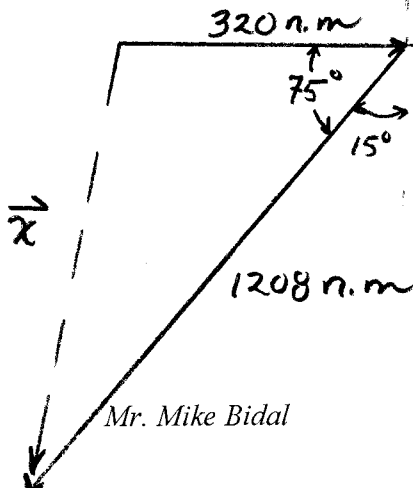


$$\vec{x}^2 = 35^2 + 57^2 - 2(35)(57)\cos 150^\circ$$

$$\vec{x} = 89.0 \text{ n.m.}$$

$\therefore$  The ship is 89.0 n.m. from its start point.

3. A ship travels due east for 320 n.m., then changes course bearing  $195^\circ$  for 1208 n.m.. How far is the ship from its starting point?

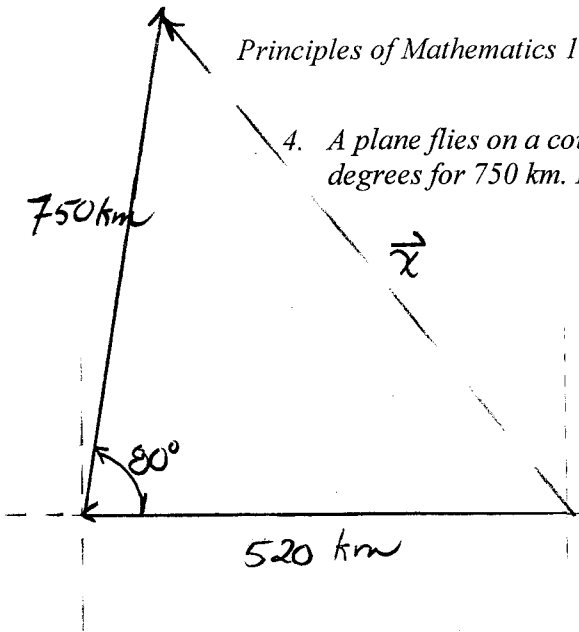


$$\vec{x}^2 = 320^2 + 1208^2 - 2(320)(1208)\cos 75^\circ$$

$$\vec{x} = 1166.9 \text{ n.m.}$$

$\therefore$  The ship is 1166.9 n.m. from its start point.

4. A plane flies on a course of  $270^\circ$  for 520 km and then changes to a course of  $10^\circ$  degrees for 750 km. How far from its starting point is the plane?

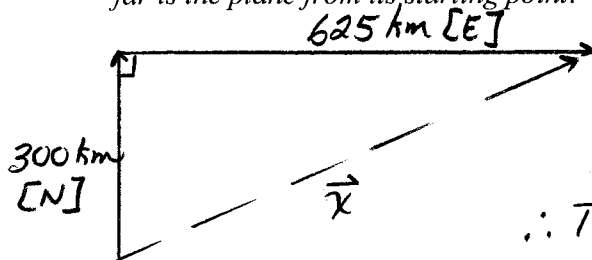


$$\vec{x}^2 = 520^2 + 750^2 - 2(520)(750)\cos 80^\circ$$

$$\vec{x} = 835.1 \text{ km}$$

$\therefore$  The plane is 835.1 km from its start point.

5. A plane flies due north for 300 km then heads exactly due east for 625 km. How far is the plane from its starting point?

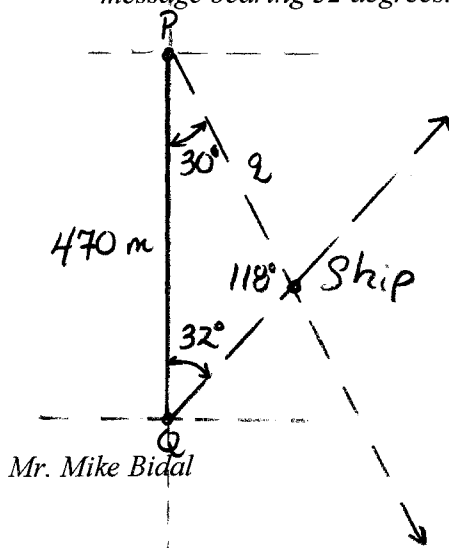


$$\vec{x}^2 = 300^2 + 625^2 \text{ [Pythagoras]}$$

$$\vec{x} = 693.3 \text{ km}$$

$\therefore$  The plane is 693.3 km from its start point.

6. Radar station P is 470 miles due north of Radar station Q. Station P receives a distress call from a ship bearing  $150^\circ$ , while station Q receives the same message bearing  $32^\circ$ . How far is the ship from station P?



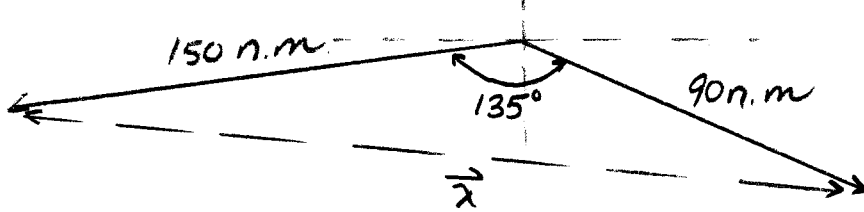
$$\frac{\sin 118^\circ}{470} = \frac{\sin 32^\circ}{z}$$

$$z = \frac{470 \sin 32^\circ}{\sin 118^\circ}$$

$$z = 282.1 \text{ miles}$$

$\therefore$  The ship is 282.1 miles from station P.

7. A ship leaves a port at noon traveling on a course bearing 125 degrees at 18 knots while another ship leaves the same port an hour earlier bearing 260 degrees at 25 knots. How far apart are the ships at 5 p.m.?



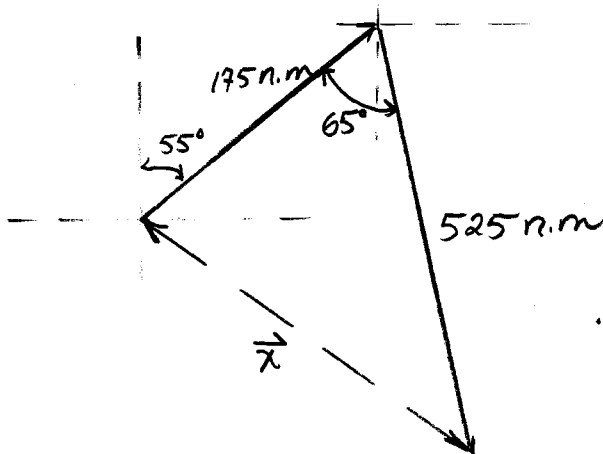
$$\vec{x}^2 = 90^2 + 150^2 - 2(90)(150)\cos 135^\circ$$

$$\vec{x} = 222.9 \text{ n.m.}$$

$$\left. \begin{array}{l} 18 \text{ knots for } 5 \text{ hrs} = 90 \text{ n.m.} \\ 25 \text{ knots for } 6 \text{ hrs} = 150 \text{ n.m.} \end{array} \right\}$$

$\therefore$  The ships are 222.9 n.m apart @ 5 p.m.

8. A ship travels N55°W for 175 n.m. then changes course to 170° to avoid a storm and travels 525 n.m. How far is the ship from its starting point?

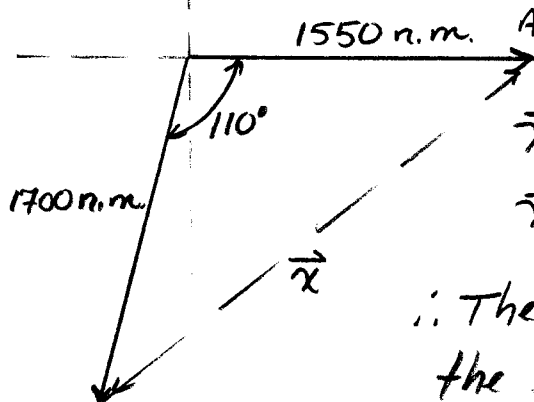


$$\vec{x}^2 = 175^2 + 525^2 - 2(175)(525)\cos 65^\circ$$

$$\vec{x} = 478.1 \text{ n.m.}$$

$\therefore$  The ships are 478.1 n.m. from the start point.

9. Two ships leave a dock at the same time. Ship A leaves on a course bearing 90 degrees while ship B leaves on a course bearing 200 degrees. If ship A traveled for 1550 n.m. and ship B traveled for 1700 n.m., how far apart are the ships?



$$\vec{x}^2 = 1700^2 + 1550^2 - 2(1700)(1550)\cos 110^\circ$$

$$\vec{x} = 2663.6 \text{ n.m.}$$

$\therefore$  The ships are 2663.6 n.m from the start point.

Parent/Guardian Signature: \_\_\_\_\_