Welcome Back MYP Math 9!

Reflect on last night's exercises.

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 11/20 Topic: 13D Solving for Angle	0 1 2	
Tuesday Date: 11/21 Topic: 13E	0 1 2	
Wednesday Date: 11/22 Topic: 13F: Bearings	0 1 2	
Thursday Date: _____ Topic: _____	0 1 2	
Friday Date: _____ Topic: _____	0 1 2	

Reflect for the week!

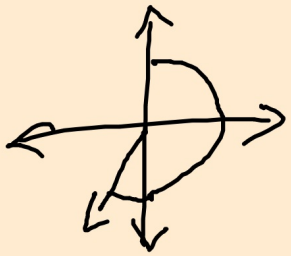
Class Plan:

1. Homework Questions??
2. Warm-up
3. Bearings & Trigonometry Practice

Warm-up: Draw the bearings.

to C from D: 200° "D to C"

to D from C: ? 20° "C to D"



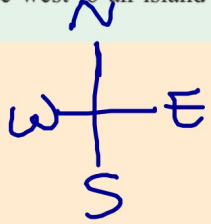
F Using trigonometry BEARINGS

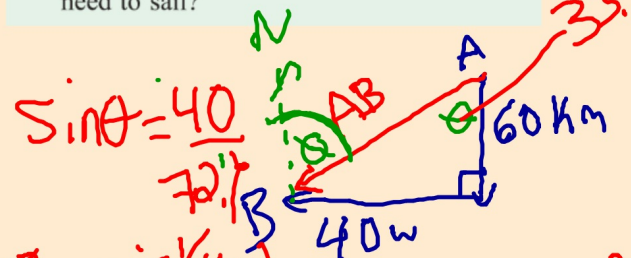
A ship leaves port A and travels 60 km due south. It then sails 40 km due west to an island port B.

a Draw a diagram of the situation.

b How far is B from A?

c The ship wishes to sail back directly to A from B. On what bearing does the captain need to sail?



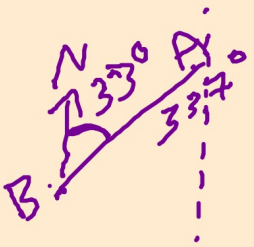


$\sin\theta = \frac{40}{72.1}$

$\theta = \sin^{-1}\left(\frac{40}{72.1}\right)$

$40^2 + 60^2 = AB^2$

$AB \approx 72.1 \text{ km}$



F Using trigonometry BEARINGS

A ship leaves port A and travels 60 km due south. It then sails 40 km due west to an island port B.

a Draw a diagram of the situation.

b How far is B from A? $a^2 + b^2 = c^2$

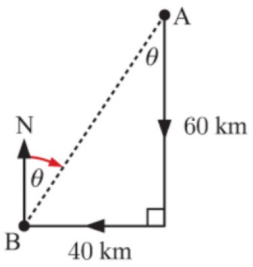
c The ship wishes to sail back directly to A from B. On what bearing does the captain need to sail?

Solution

$$\tan\theta = \frac{40km}{60km}$$

$$\theta = \tan^{-1}\left(\frac{40}{60}\right) \approx 34^\circ$$

a

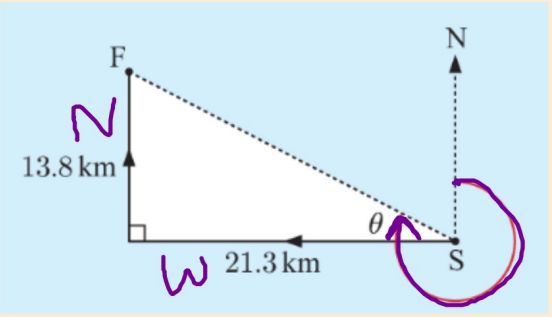


b ≈ 72.1 km

c 034°

Example 7 Self Tuto

A cyclist rides 21.3 km due west and then 13.8 km due north. Find, to the nearest degree, the bearing of the finishing point from the starting point.



Example 7 **Self Tutor**

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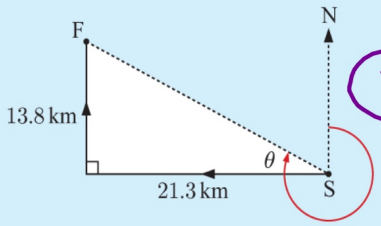


$\tan\theta = \dfrac{13.8}{21.3}$ $\left\{\tan\theta = \dfrac{\text{OPP}}{\text{ADJ}}\right\}$

$\therefore\ \theta = \tan^{-1}\left(\dfrac{13.8}{21.3}\right) \approx 32.9°$

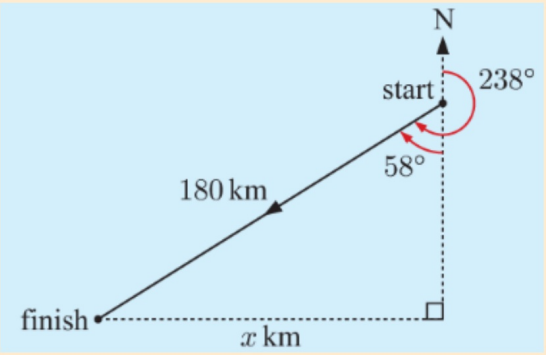
$\therefore\ 270° + \theta \approx 303°$

So, the bearing of F from S is about 303°.

303°

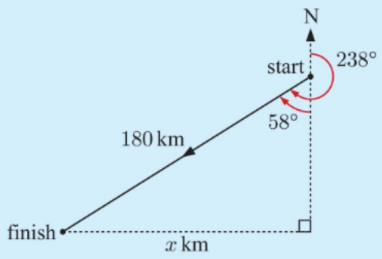
Example 8 Self Tuto

A ship sails for 180 km on the bearing 238°. How far is the ship west of its starting point?



Example 8 **Self Tutor**

A ship sails for 180 km on the bearing 238°. How far is the ship west of its starting point?



$\sin 58° = \dfrac{x}{180}$ $\quad \{\sin\theta = \dfrac{\text{OPP}}{\text{HYP}}\}$

$\therefore \ x = 180 \times \sin 58°$

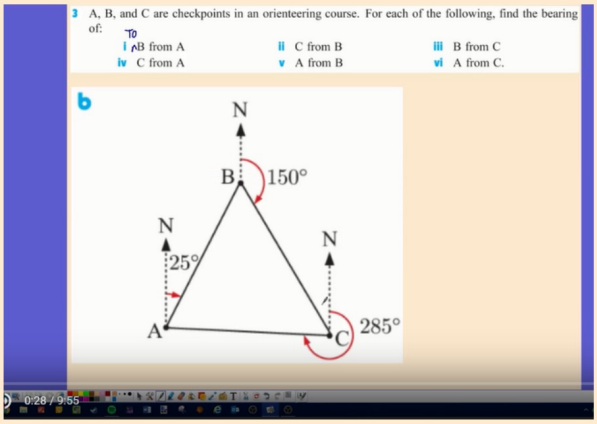
$\therefore \ x \approx 152.6$

The ship is about 153 km west of its starting point.

F Video Resources for Bearings BEARINGS

Mr. Nelson (9th grade math teacher from 2016-2017 school year) solving #3b from homework!

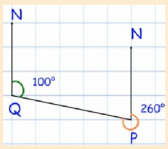
https://drive.google.com/file/d/0B-nZ19U_--tzTUNmTUNCUGpoSXM/view



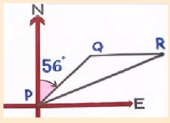
F Video Resources for Bearings BEARINGS

Example of drawing and finding a bearing. (7+ min)
https://www.youtube.com/watch?v=mMrf1Wn6-XA

Examples of calculating bearings. (2+ min)
https://www.youtube.com/watch?v=Mu3rMWoOXGk



Example of trigonometry and bearings. (7+ min)
https://www.youtube.com/watch?v=Deottosec7s



Exercises....

1) I am somewhat confident.
(#7 - #10)

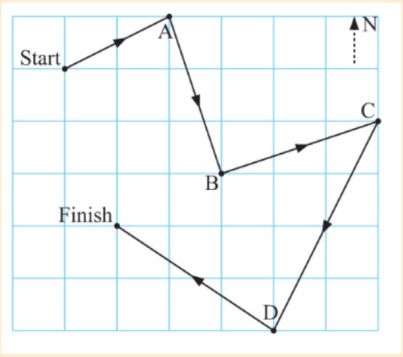
2) I am confident and ready for a challenge.
(#6 - #11)

Enjoy time with friends & family.

We are thankful for all of you! :)

6 An orienteer is studying the map for a competition. Each grid unit represents 1 km. Find the distance and true bearing from:

- **a** the start to A
- **b** A to B
- **c** B to C
- **d** C to D
- **e** D to the finish.



Solution

13F Bearings Name _____

6 An orienteer is studying the map for a competition. Each grid unit represents 1 km. Find the distance and true bearing from:

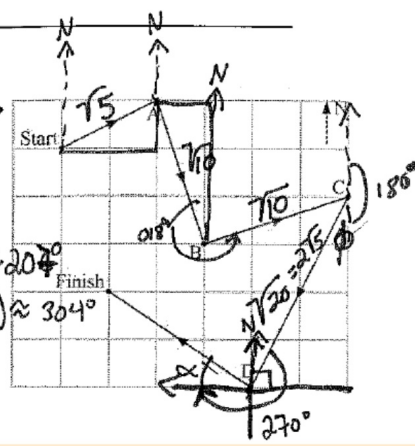
2.24 a the start to A $\sqrt{5}$ $\theta = \tan^{-1}(2) \approx 63°$

3.16 b A to B $\sqrt{10}$ $180 - \theta = 180 - \tan^{-1}(\frac{1}{3}) \approx 162°$

3.16 c B to C $\sqrt{10}$ $90 - \theta = 90 - \tan^{-1}(\frac{1}{3}) \approx 72°$

4.47 d C to D $\sqrt{20} = 2\sqrt{5}$ $180 + \phi = 180 + \tan^{-1}(\frac{2}{4}) \approx 207°$

3.61 e D to the finish. $\sqrt{13}$ $270 + \alpha = 270 + \tan^{-1}(\frac{2}{3}) \approx 304°$



7 A small plane flies between two country airfields. Its destination is 18.4 km south and 27.3 km west of its origin. Find, to the nearest degree, the bearing on which the plane flies.

8 A swimmer swims for 68 m on the bearing 036°.
How far is the swimmer **a** north **b** east of her starting point?

Solution

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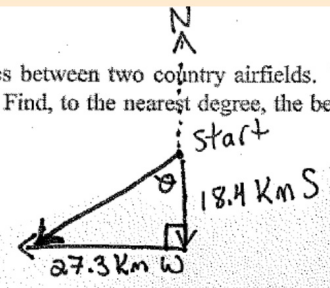


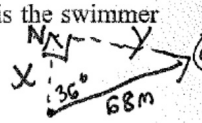
$\tan\theta = \frac{27.3}{18.4}$

$\theta = \tan^{-1}\left(\frac{27.3}{18.4}\right)$

bearing $= 180 + \tan^{-1}\left(\frac{27.3}{18.4}\right)$

$\approx 236°$

8 A swimmer swims for 68 m on the bearing 036°.
How far is the swimmer a north b east of her starting point?



(a) $\cos 36 = \frac{X}{68}$ (b) $\sin 36 = \frac{Y}{68}$

$X = 68\cos 36$

(a) $X \approx 55$ Km

$Y = 68 \sin 36$

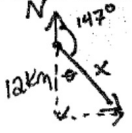
$Y \approx 40$ Km

9 A helicopter pilot flies in the direction $147°$ and lands when he is 12 km south of his starting point. How far did he fly?

10 An aeroplane travels on the bearing $315°$ until it is 650 km west of its starting point. How far north is it from its starting point?

Solution

9 A helicopter pilot flies in the direction 147° and lands when he is 12 km south of his starting point. How far did he fly?



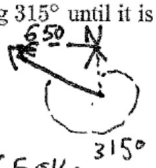
$\theta = 180 - 147$

$\theta = 33°$

$\cos 33 = \frac{12}{x}$

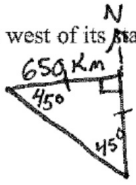
$x = \frac{12}{\cos 33}$ $\approx 14.3\,Km$

10 An aeroplane travels on the bearing 315° until it is 650 km west of its starting point. How far north is it from its starting point?



$\tan 45 = \frac{650}{x}$

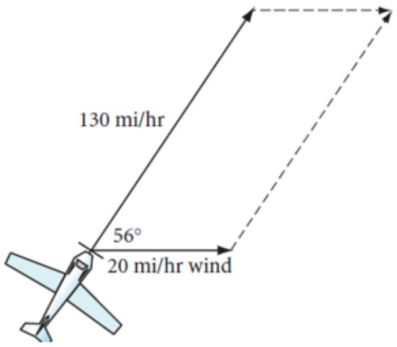
$x = \frac{650}{\tan 45} = 650Km$



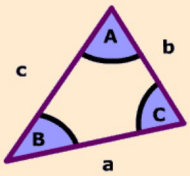
650 Km

Extensions to Bearings (Trigonometry required)

11 Gerald is flying his airplane as shown in the diagram. His instrument panel shows an air speed of 130 mi/hr. (Air speed is the speed in still air without wind.) However, there is a 20 mi/hr. crosswind. What is the resulting speed of the plane?



Law of Cosines



$a^2 = b^2 + c^2 - 2bc \cdot \cos(A)$

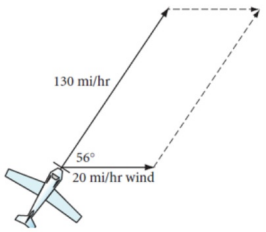
$b^2 = a^2 + c^2 - 2ac \cdot \cos(B)$

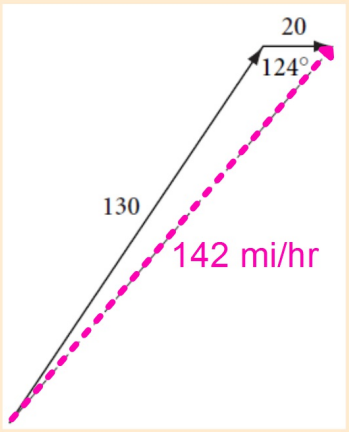
$c^2 = a^2 + b^2 - 2ab \cdot \cos(c)$

Solution

Extensions to Bearings (Trigonometry required)

11 Gerald is flying his airplane as shown in the diagram. His instrument panel shows an air speed of 130 mi/hr. (Air speed is the speed in still air without wind.) However, there is a 20 mi/hr. crosswind. What is the resulting speed of the plane?





11) N, 20 mi., 130 mi., (s) SPEED, 180 − 56 = 124°

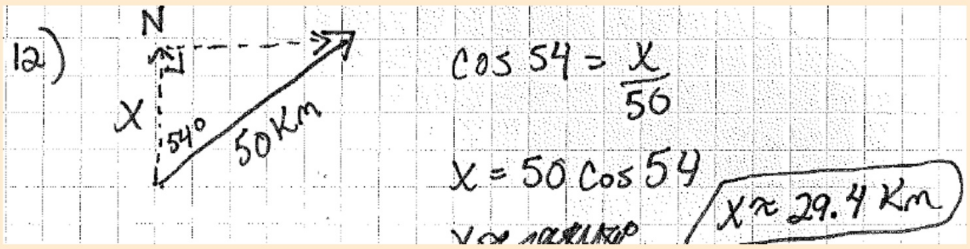
$s^2 = 130^2 + 20^2 - 2(130)(20)\cos 124$

$s^2 = 17{,}300 - 5200\cos 124$

$s = \sqrt{17300 - 5200\cos 124}$

$s \approx 142$ Km/hr

12 A boat sails 50 km on the bearing 054°. How far is the ship north of its starting point?



13 The course for a yachting race is shown alongside. Each grid unit represents 1 km. Find the distance and true bearing from:

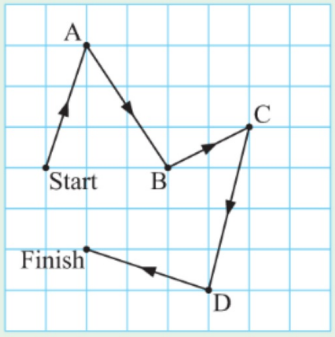
a the start to A

b A to B

c B to C

d C to D

e D to the finish.



Solution

13) $\overline{SA} = \sqrt{10} \approx 3.16\text{Km}$

$\theta = \tan^{-1}\left(\frac{1}{3}\right) \approx 018°$

$\overline{AB} = \sqrt{13} \approx 3.61$

$\theta = \tan^{-1}\left(\frac{3}{2}\right) + 90° \approx 146°$

$\overline{BC} = \sqrt{5} \approx 2.44\text{Km}$

$\theta = \tan^{-1}(2) \approx 063°$

$\overline{CD} = \sqrt{17} \approx 4.12\text{Km}$

$\theta = \tan^{-1}\left(\frac{1}{4}\right) + 180° \approx 194°$

$\overline{DF} = \sqrt{10} \approx 3.16\text{Km}$

$\theta = 270° + \tan^{-1}\left(\frac{1}{3}\right) \approx 288°$

Solutions to Bearings problems:

6 **a** ≈ 2.24 km, 063° **b** ≈ 3.16 km, 162°
c ≈ 3.16 km, 072° **d** ≈ 4.47 km, 207°
e ≈ 3.61 km, 304°

7 236° **8** **a** ≈ 55.0 m **b** ≈ 40.0 m

9 ≈ 14.3 km **10** 650 km

11 About 142 mi/hr.