Math20-1 Assignment 8 Key (yesterday's assign)

A ship observes a lighthouse in a direction 50° W of N. After sailing 36 km in a direction 35° W of S the lighthouse is observed in a direction 15° E of N.

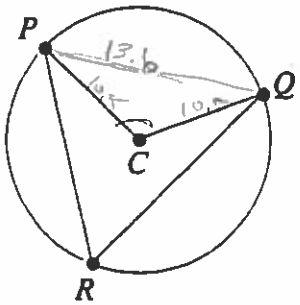
a) Draw a sketch showing the information given.

b) Calculate the distance of the ship from the lighthouse when the second observation is made.

Complete Assignment Questions #6 - #16

Assignment

1. In the diagram, chord $PQ = 13.6$ cm, and radius $CP = 10.5$ cm. Determine the measure of angle PRQ, to the nearest degree.



SSS COS

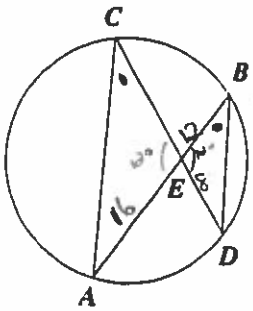
$$\cos A = \frac{10.5^2 + 10.5^2 - 13.6^2}{2(10.5)(10.5)}$$

$$= \frac{35.54}{220.5}$$

$\angle C = 80.7$

$\angle R = 50°$ 40°

2. In the diagram, the chords AB and CD intersect at E. $EB = 12$ cm, $EA = 16$ cm, $ED = 8$ cm, and $\angle BED = 120°$.



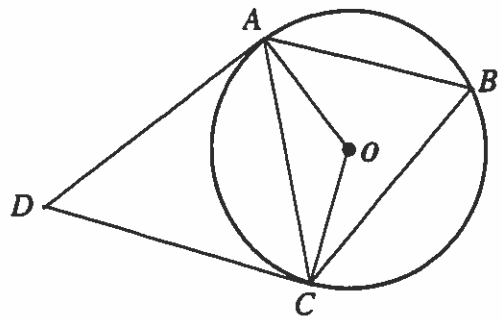
a) Calculate the length of BD to two decimal places.

b) Determine the measure of $\angle ACD$ to the nearest degree.

$\angle C = \angle B \rightarrow$ 2 inscribed angles opp common arc are equal.

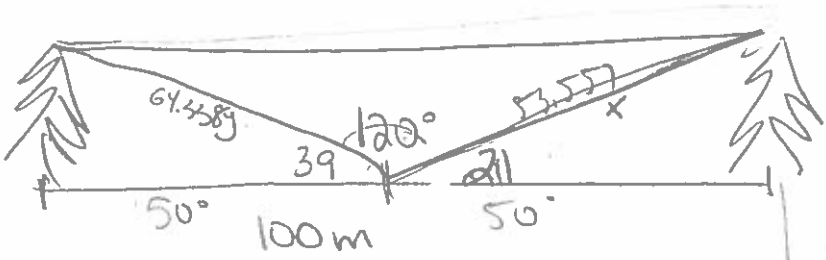
3. In the diagram, DA and DC are tangents to the circle with centre O. Angle $ABC = 65°$ and $AC = 4.5$ inches.

a) Explain why angle $ADC = 50°$.



b) Determine the length of CD to the nearest tenth of an inch.

4. Two spruce trees are 100m apart. From the point on the ground halfway between the trees the angles of elevation to the tops of the trees are 21° and 39°. Determine the distance, to the nearest metre, between the tops of the two trees.



$180 - 39 - 21$

$\cos 39 = \frac{50}{y}$

$y = \frac{50}{\cos 39}$

$y = 64.338$

$\cos 21 = \frac{50}{x}$

$x = \frac{50}{\cos 21}$

$x = 53.557$

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

$= (64.338)^2 + (53.557)^2 - 2(64.338)(53.557)\cos 120$

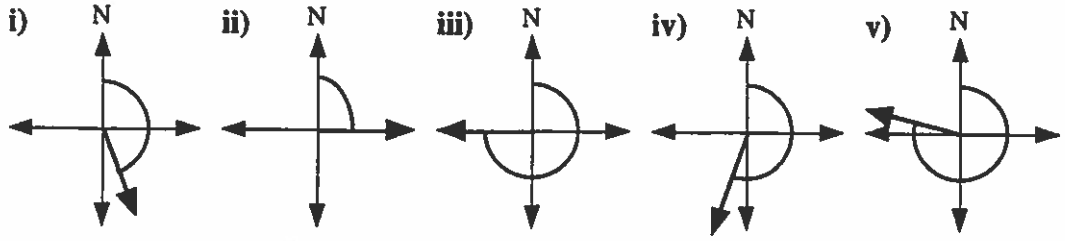
$= 7007.75 - 6891.53\cos 120$

$= 10453.51$

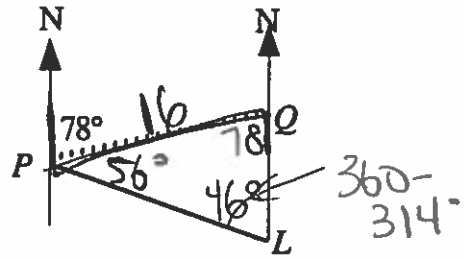
$= \boxed{102\text{m}}$

5. Pair the following bearings with the correct diagram.

a) 270° **b)** 160° **c)** 285° **d)** 90° **e)** 200°



6. A ship is steaming at 16 km/h on a course of 78°, illustrated by the dotted line in the diagram. *L* represents the position of a lighthouse. At 0800 hours the ship is at *P*, which is on a bearing of 314° from *L*, and one hour later it is at *Q*, which is due north of *L*.



a) Determine the measures of angles *PLQ* and *LPQ*.

LQ opp interior to 78°

180 - 78 - 46 = 56°

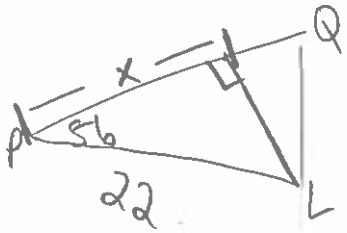
b) Calculate the distance *PL*, to the nearest kilometre.

$$\frac{PL}{\sin 78} = \frac{16}{\sin 46}$$

PL = 22

c) At what time, to the nearest minute, is the ship nearest to the lighthouse?

closest is ⊥ path



$\cos 56 = \frac{x}{22}$

$22 \cos 56 = x$

$x = 12.3$

$\frac{12.3 \text{ km}}{16 \text{ km}} = 0.768$

0.76875×60

$= 46.125$ mins

0846

7. At 12 noon a ship observes a lighthouse at a distance of 15 km in a direction of N50°E. It sails at 15 km/h in a direction S35°W. Find the distance and direction of the lighthouse from the ship at 3 pm. Answer to the nearest whole number.

Multiple Choice

In questions 8 -10 you are to decide which is the most appropriate method for solving the problem.

8. Yachts in a race have to sail a triangular course. First they sail in a direction of S45°E for 8 km. They change direction and sail on a course of N45°E. The last part of the course is to return to the start by sailing due West. How far was the second part of the course? The most appropriate method for solving this problem is

   A. *SOHCAHTOA*

   B. the Sine Law

   C. the Cosine Law

   D. the problem cannot be solved without further information.

9. In ΔABC, $BA = 9$ cm, $AC = 13$ cm and $\angle ABC = 113°$. Calculate the measure of $\angle BCA$. The most appropriate method for solving this problem is

   A. *SOHCAHTOA*

   B. the Sine Law

   C. the Cosine Law

   D. the problem cannot be solved without further information.

10. A pilot leaves base flying on a bearing of 340°. After 30 minutes he changes course to 108° and flies in this direction until he is due north of base. How far does he have to fly South to return to base? The most appropriate method for solving this problem is

    A. *SOHCAHTOA*

    B. the Sine Law

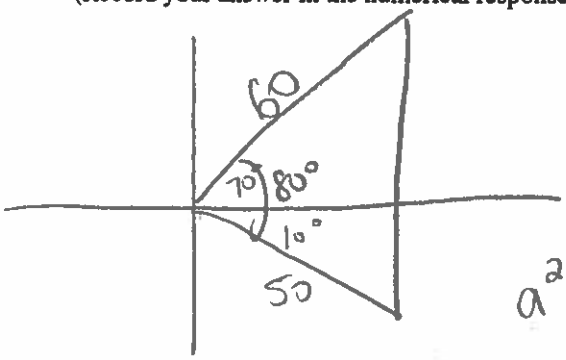
    C. the Cosine Law

    D. the problem cannot be solved without further information.

Numerical Response

11. Two aircraft X and Y leave an airport at the same time. X flies on a course of 70° at 720 km/h, and Y flies on a course of 350° at 600 km/h.
To the nearest kilometre, the distance between the aircraft after 5 minutes is _____ .

(Record your answer in the numerical response box from left to right.)



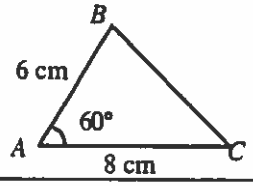
$$\frac{720}{60} = \frac{\quad}{5}$$

$$a^2 = 6100 - 6000\cos 80 \quad \frac{600}{60} \div \frac{\quad}{5}$$

$$= 71.1$$

Use the following information to answer questions #12 and #13.

In triangle ABC, angle $BAC = 60°$, $AB = 6$ cm, and $AC = 8$ cm.



12. The length of BC, to the nearest tenth of a cm, is _____ .

(Record your answer in the numerical response box from left to right.)

13. The ratio $\dfrac{\sin C}{\sin B}$, to the nearest hundredth, is _____ .

(Record your answer in the numerical response box from left to right.)

Use the following information to answer questions #14 - #16.

The minute hand of a clock is 12 cm long and the hour hand is 10 cm long.

14. To the nearest degree, the angle between these hands at 5 o'clock is _____ .

(Record your answer in the numerical response box from left to right.) | 1 | 5 | 0 | |

$\frac{360}{12} = 30°$ for every 5 min

$30 \times 5 =$

15. To the nearest degree, the angle between these hands at 7:30 pm is _____ .

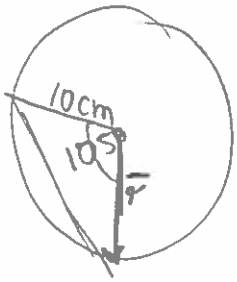
(Record your answer in the numerical response box from left to right.) | 4 | 5 | | |

at 7:30 hour hand is ½ way between 7 & 8

$30° + 15°$

16. To the nearest 0.1 cm, the distance between the tips of the hands at 9:30 pm is _____ .

(Record your answer in the numerical response box from left to right.) | 1 | 7 | . | 5 |



$30 \times 3 + 15 = 105°$

$a^2 = 10^2 + 12^2 - 2(10)(12)\cos 105$

$= 244 - 240 \cos 105$

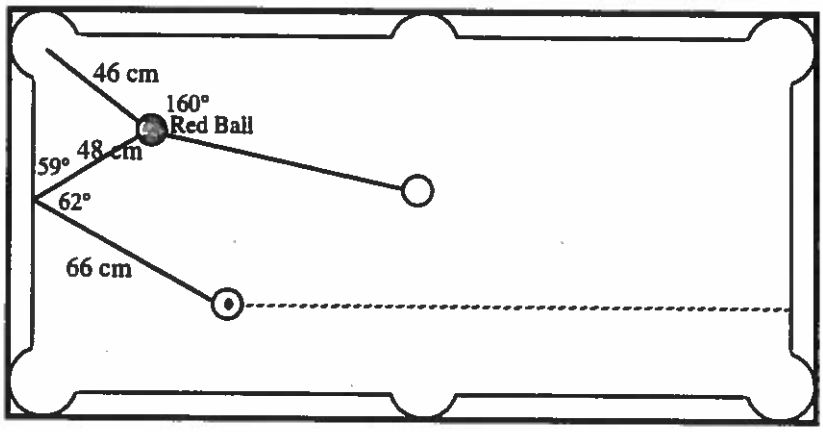
$a^2 = 306.11$

$= 17.5$

Group Work

Billiards is a game like pool or snooker which is played by two players on a rectangular table 3.66 metres long by 1.86 metres wide. Three balls are used - white, spot white and red. The object of the game is to score points by pocketing balls (called hazards) or by hitting both other balls (called cannons).

In the diagram Bob propels his white ball on to the red ball which goes in to the corner pocket (scoring 3 points). The white ball deflects off the red ball on to the left cushion, rebounds, and strikes his opponent's spot white (scoring a further 2 points).



a) If the measurements are as in the diagram, calculate the distance, to the nearest cm, between the red ball and the spot white ball before Bob attempts his shot.

b) After the spot white is hit by the white ball it travels parallel to the bottom cushion until it stops just touching the right cushion. To the nearest 10 cm, calculate the distance travelled by the spot white (ignore the width of the ball in the calculation).

Answer Key

1. 40° 2. a) 17.44 cm b) 23°

3. a) Angle DAO = Angle DCO = 90°, Angle AOC = 2 × 65 = 130°.
   Angle ADC = 360° − 90° − 90° − 130° = 50°
   b) 5.3 inches

4. 102 m 5. a) iii) b) i) c) v) d) ii) e) iv)

6. a) 46°, 56° b) 22 km c) 0846

7. 60 km in a direction N 39° E 8. A 9. B 10. D

11. | 7 | 1 | | |

12. | 7 | . | 2 | |

13. | 0 | . | 7 | 5 |

14. | 1 | 5 | 0 | |

15. | 4 | 5 | | |

16. | 1 | 7 | . | 5 |

Group Work a) 61 cm b) 310 cm