

Multiple Choice: (12 marks) Fill in answers in the table at the end. Scan and e-mail only the multiple choice answers and long answer workings.

1) Which answer below is true about similar triangles?

- a) They have corresponding sides that are congruent sides.
- b) The ratios of corresponding sides all equal to 1.
- c) The ratios of corresponding sides are all equal.
- d) They have the same size and shape.

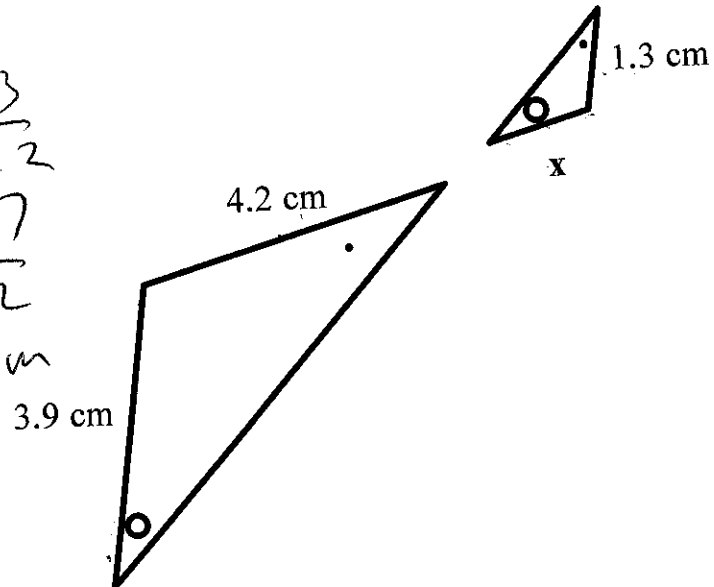
2) Solve for x.

- a) 0.9 cm
- b) 12.6 cm
- c) 16.8 cm
- d) 21.3 cm

$$\frac{x}{3.9} = \frac{1.3}{4.2}$$

$$4.2x = \frac{5.07}{4.2}$$

$$x = 1.2 \text{ cm}$$



3) Which answer below is true?

- a) If you subtract any value from each number in a Pythagorean triple, the result will still be a Pythagorean triple.
- b) If you add any value from each number in a Pythagorean triple, the result will still be a Pythagorean triple.
- c) If you multiply the same value from each number in a Pythagorean triple, the result will still be a Pythagorean triple.
- d) You can perform any math operation to a Pythagorean triple and still have a Pythagorean triple as a result.

4) A triangle has sides 2, 3 and $\sqrt{14}$. Which answer below is true?

- a) It is a right triangle because its sides make up a Pythagorean triple.
- b) It is a right triangle because its sides do not make up a Pythagorean triple.
- c) It is not a right triangle because its sides make up a Pythagorean triple.
- d) It is not a right triangle because its sides do not make up a Pythagorean triple.

$$2^2 + 3^2 = \sqrt{14}^2$$

$$4 + 9 = 14$$

$$13 \neq 14$$

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5) If $\cos(x) = P$, which answer below is true?

- a) $\sin(90^\circ + x) = P$
 b) $\sin(90^\circ - x) = P$
 c) $\sin(180^\circ - x) = P$
 d) $\sin(x) = P$

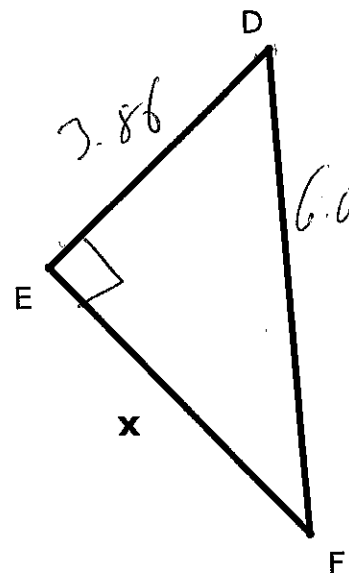
6) If $\tan(67^\circ) = x$, which answer below is true?

- a) $\frac{\cos(67^\circ)}{\sin(67^\circ)} = x$
 b) $\frac{\sin(67^\circ)}{\cos(67^\circ)} = x$
 c) $\frac{\sin(67^\circ)}{\cos(23^\circ)} = x$
 d) $\frac{\sin(23^\circ)}{\cos(67^\circ)} = x$

7) What is the value for x in the diagram to the right?

- a) 2.2 cm
 b) 4.6 cm
 c) 7.2 cm
 d) 21.6 cm

$m\angle DEF = 90^\circ$
 $DE = 3.86$ cm
 $DF = 6.04$ cm



$$6.04^2 = 3.86^2 + x^2$$

$$36.48 = 14.90 + x^2$$

$$21.58 = x^2$$

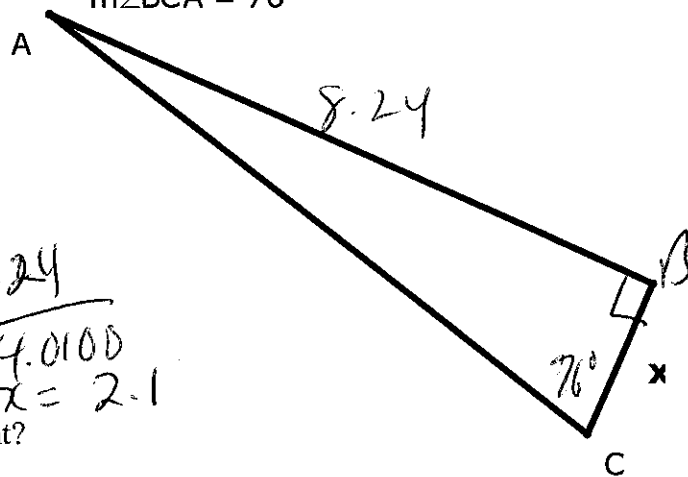
$$\sqrt{21.58} = \sqrt{x^2}$$

$$4.6 = x$$

8) What is the value for x in the diagram to the right?

- a) 2.1 cm
- b) 8.5 cm
- c) 34.1 cm
- d) 33.0 cm

$m\angle ABC = 90^\circ$
 $AB = 8.24$ cm
 $m\angle BCA = 76^\circ$



$$\tan 76^\circ = \frac{8.24}{x}$$

$$4.0108 = \frac{8.24}{x}$$

$$4.0108x = 8.24$$

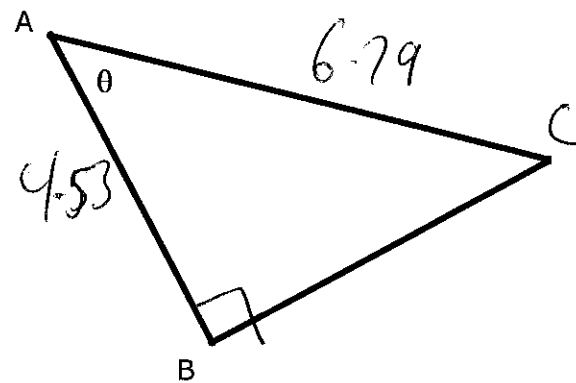
$$\frac{4.0108x}{4.0108} = \frac{8.24}{4.0108}$$

$$x = 2.1$$

9) What is the value for θ in the diagram to the right?

- a) 33.7°
- b) 41.8°
- c) 48.2°
- d) 56.3°

$m\angle ABC = 90^\circ$
 $AC = 6.79$ cm
 $AB = 4.53$ cm



$$\cos \theta = \frac{4.53}{6.79}$$

$$\cos \theta = 0.6672$$

$$\cos^{-1}(\cos \theta) = \cos^{-1}(0.6672)$$

$$\theta = 48.2^\circ$$

10) Which bearing below would represent a direction of Due South?

- a) 0°
- b) 90°
- c) 180°
- d) 270°

11) What is $3\sqrt{52} - 4\sqrt{117}$?

- a) $-18\sqrt{13}$
- b) $-6\sqrt{13}$
- c) $6\sqrt{13}$
- d) $18\sqrt{13}$

$$3\sqrt{4 \times 13} - 4\sqrt{9 \times 13}$$

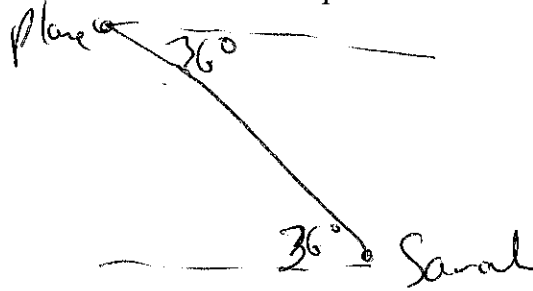
$$= 3 \cdot 2\sqrt{13} - 4 \cdot 3\sqrt{13}$$

$$= 6\sqrt{13} - 12\sqrt{13}$$

$$= -6\sqrt{13}$$

12) Sarah is looking at an airplane in the sky at an angle of elevation of 36° . At what angle of depression would someone on the airplane have to look and see Sarah on the ground?

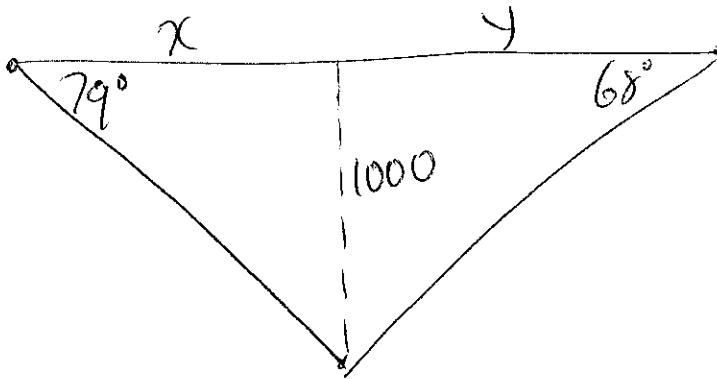
- a) 36°
- b) 45°
- c) 54°
- d) 90°



Multiple Choice Answers

1. C	7. b
2. Play 1.2.	8. a
3. C	9. C
4. d	10. C
5. b	11. b
6. b	12. a

- 1) Two helicopters, flying at an altitude of 1000m, spot a lost individual on the ground below. The first helicopter is looking down at the individual with an angle of depression of 79° while the second helicopter is looking down at an angle of depression of 68° . If the two helicopters are at opposite ends of the individual, how far apart are they? (6 marks)



$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan 79^\circ = \frac{1000}{x}$$

$$\tan 68^\circ = \frac{1000}{x}$$

$$\frac{5.1446}{1} = \frac{1000}{x}$$

$$\frac{2.4751}{1} = \frac{1000}{x}$$

$$\frac{5.14}{5.1446} x = \frac{1000}{5.1446}$$

$$\frac{2.47517x}{2.4751} = \frac{1000}{2.4751}$$

$$x = 194.4 \text{ m}$$

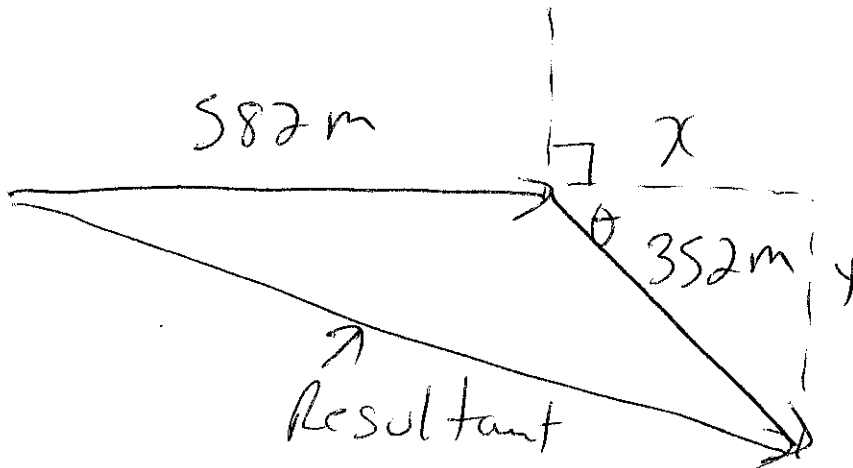
$$x = 404.0 \text{ m}$$

The helicopters are $404.0 + 194.4 = 598.4 \text{ m}$ apart.

2) Suppose you were to follow this orienteering path:

- 582 m at a bearing of 90° , then
- 352 m at a bearing of 135°

Find the length and bearing of the resultant vector. (6 marks)



$= 90^\circ$
 $135^\circ - 90^\circ = \theta$
 $45^\circ = \theta$

$\sin 45^\circ = \frac{y}{352}$

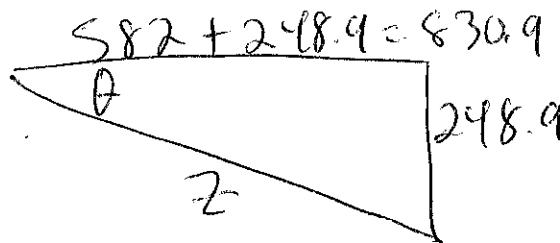
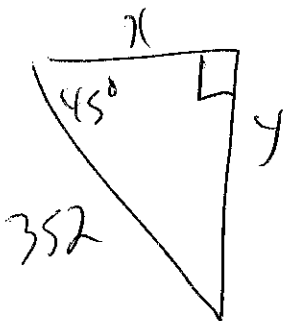
$\cos 45^\circ = \frac{x}{352}$

$\frac{0.7071}{1} = \frac{y}{352}$

$\frac{0.7071}{1} = \frac{x}{352}$

$y = 248.9 \text{ m}$

$x = 248.9 \text{ m}$



$z^2 = 248.9^2 + 830.9^2$

$z^2 = 61951.21 + 690394.81$

$z^2 = 752346.02$

$\sqrt{z^2} = \sqrt{752346.02}$

$z = 867.4 \text{ m}$

$\tan \theta = \frac{\text{opp}}{\text{adj}}$
 $\tan \theta = \frac{248.9}{830.9}$
 $\tan \theta = 0.2996$
 $\theta = \tan^{-1}(0.2996)$

Distance of Resultant 867.4 m

Bearing = $16.7^\circ + 90^\circ = 106.7^\circ$

3) Solve the following for x and show all possible workings.

a. $x = \sqrt{5x+6}$ (3 marks)

$$x^2 = \sqrt{5x+6}^2$$

$$x^2 = 5x+6$$

$$x^2 - 5x - 6 = 0$$

$$(x-6)(x+1) = 0$$

$$x = 6, x = -1$$

Check

$$6 = \sqrt{5(6)+6}$$

$$6 = \sqrt{30+6}$$

$$6 = \sqrt{36}$$

$$6 = 6 \checkmark$$

$$-1 = \sqrt{5(-1)+6}$$

$$-1 = \sqrt{-5+6}$$

$$-1 = \sqrt{1}$$

$\sqrt{\quad}$ is assumed to be positive. Not a calculation.

b. $|3x-7|-8=4$ (3 marks)

$$|3x-7| = 4+8$$

$$|3x-7| = 12$$

$$3x-7=12 \quad \text{or} \quad -(3x-7)=12$$

$$3x = 12+7$$

$$\frac{3x}{3} = \frac{19}{3}$$

$$x = \frac{19}{3}$$

$$-3x+7=12$$

$$-3x = 12-7$$

$$-3x = 5$$

$$x = \frac{-5}{3}$$

Check:

$$|3(\frac{-5}{3})-7|-8=4$$

$$|-5-7|-8=4$$

$$|-12|-8=4$$

$$12-8=4$$

$$4=4$$

$$|3(\frac{19}{3})-7|-8=4$$

$$|19-7|-8=4$$

$$12-8=4$$

$$4=4$$