High School Mathematics Test 2015

Year 9

Right Triangle Trigonometry

Calculator Allowed

Skills and Knowledge Assessed:

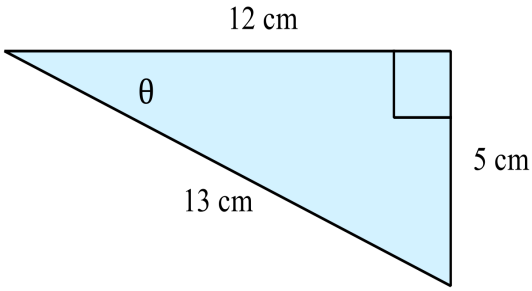
- Use similarity to investigate the constancy of the sine, cosine and tangent ratios for a given angle in right - angled triangles (ACMMG223)
- Apply trigonometry to solve right - angled triangle problems (ACMMG224)
- Solve right- angled triangle problems including those involving direction and angles of elevation and depression (ACMMG245)

Name_____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.

1. In the diagram, what is the value of $\sin\theta$?



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2. Evaluate $5 \times \cos 55°$, correct to 3 decimal places.

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3. Given that $\cos \alpha = \frac{14}{25}$, what is α, correct to the nearest degree?

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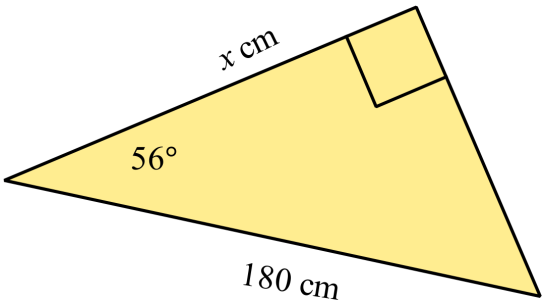
4. Find the value of x, correct to the nearest cm.



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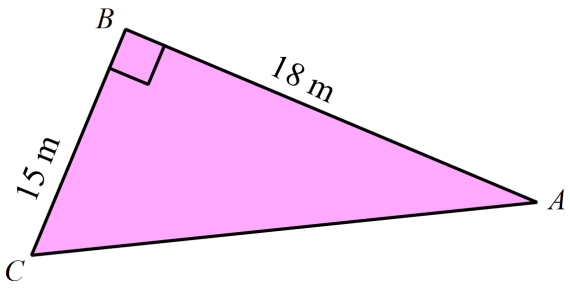
5. Find the size of $\angle A$, to the nearest degree.



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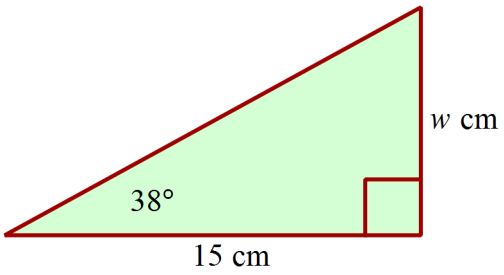
6. Find the value of w, correct to 1 decimal place.



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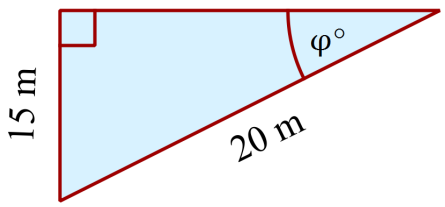
7. Find the value of φ, to the nearest degree.



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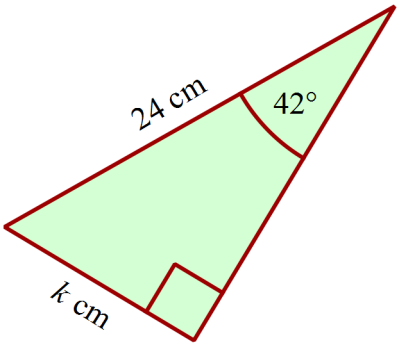
8. Find the value of k, correct to 1 decimal place.



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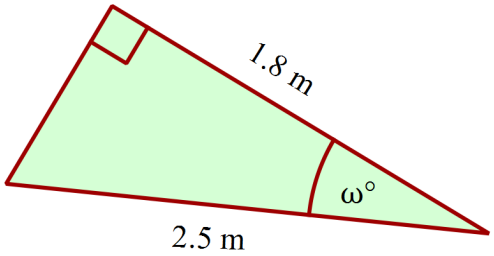
9. Find the value of ω, correct to the nearest degree.



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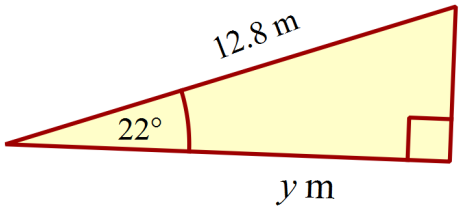
10. What is the value of y, correct to 3 significant figures?



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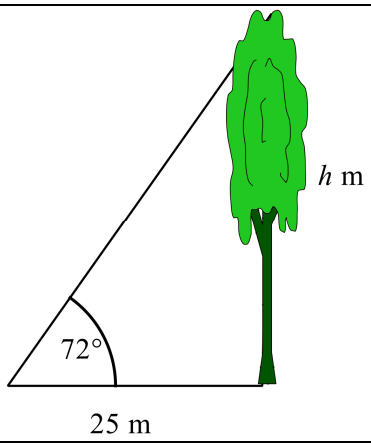
11. Find the height of the tree (h), correct to the nearest 10th of a metre.



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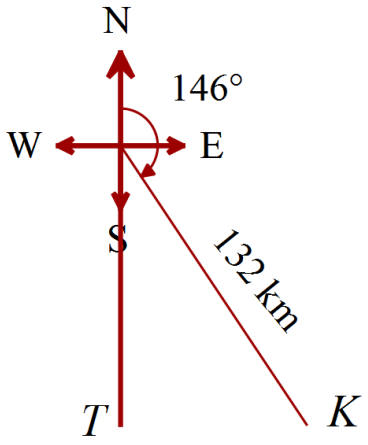
12. Kevin and Tim both leave Manjimup by plane at midday.

Kevin flies 132 km on a bearing 146° before landing.

Tim flies due south, and lands at a point which is due west of where Kevin lands.

How far apart are Tim and Kevin when they land?



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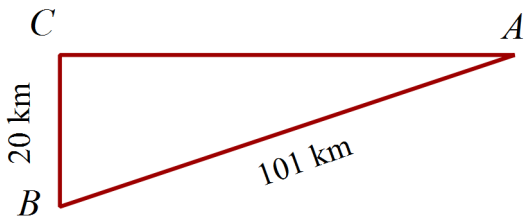
13. Town *B* is 20 km south of town *C*.

Town *A* is due east of town C.

The distance from town A to town B is 101 km.

What is the bearing of town B from town A?



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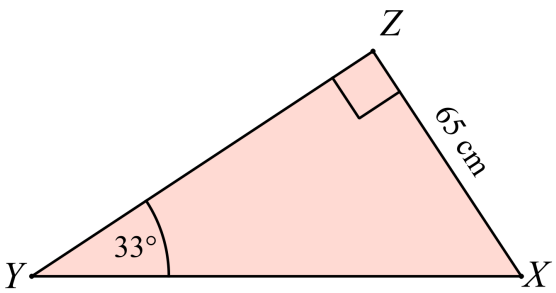
14. Find the length of XY, correct to 1 decimal place.



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15. The distance AD = 12.5 cm and $\angle A = 38°$.

Find the distance *DC*.

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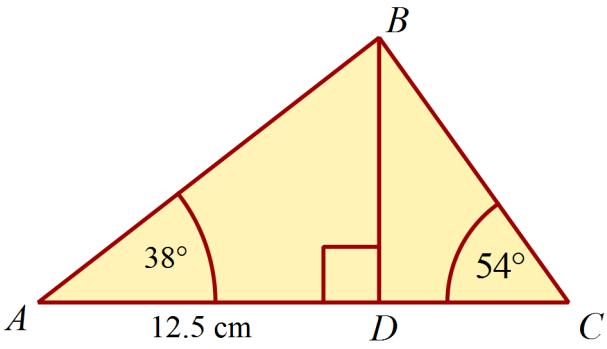


High School Mathematics Test 2015

Year 9

Right Triangle Trigonometry

Calculator Allowed

Name_____

Section 2 Multiple Choice Section

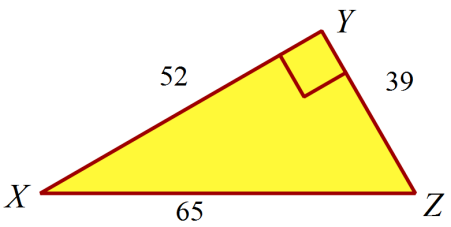
Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

1. What is the vlaue of $8 \times \tan 69°$, correct to 2 decimal places?

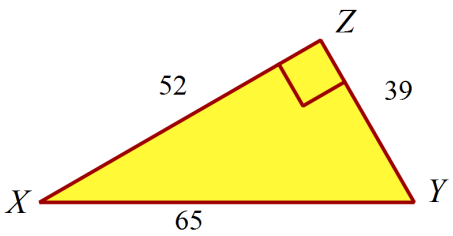
A. 2.87 B. 7.47 C. 8.57 D. 20.84

2. In which triangle is $\cos X = \frac{39}{65}$?

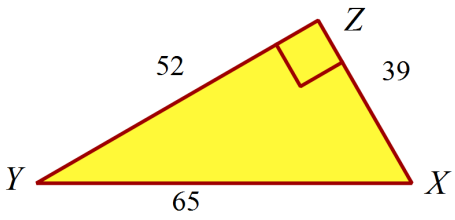
A.



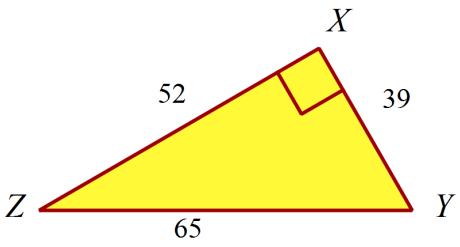
B.



C.



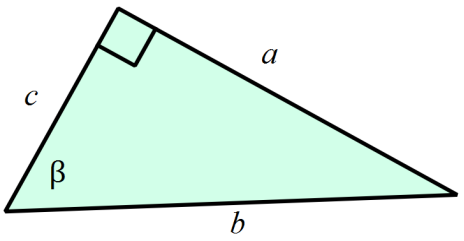
D.



3. $\sin \beta = ?$

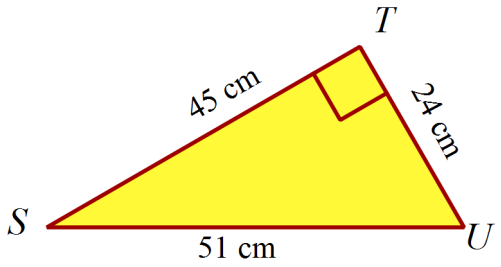
A. $\frac{a}{b}$ B. $\frac{a}{c}$

C. $\frac{b}{a}$ D. $\frac{b}{c}$



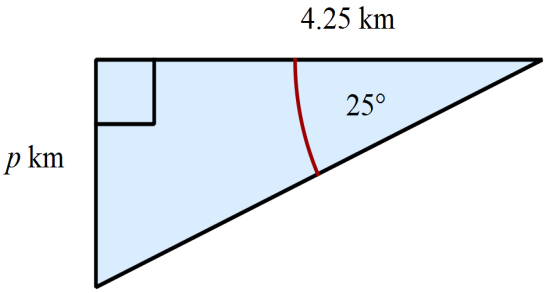
4. Find the size of $\angle TUS$.

A. 29°
B. 32°
C. 57°
D. 62°



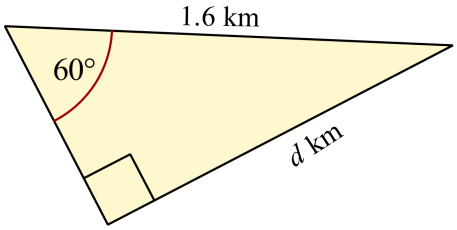
5. Find the value of p correct to two decimal places.

A. 1.80 km
B. 1.98 km
C. 3.85 km
D. 10.06 km



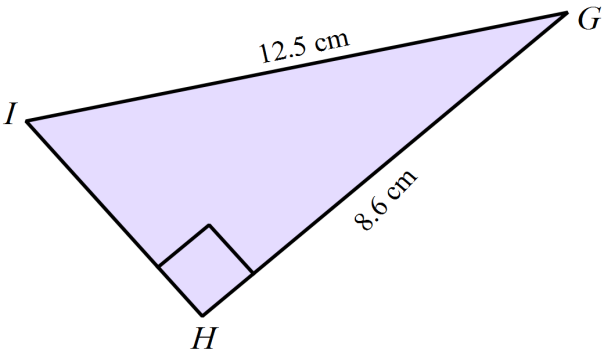
6. Find the value of d correct to one decimal place.

A. 0.8 km
B. 1.4 km
C. 1.8 km
D. 2.8 km



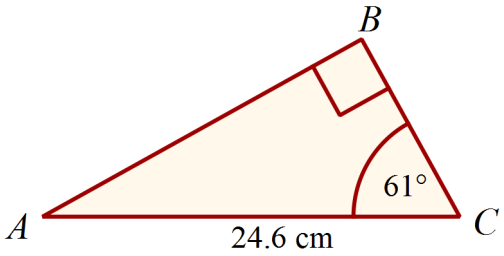
7. Find the size of $\angle G$ correct to the nearest degree.

A. 35°
B. 36°
C. 47°
D. 54°



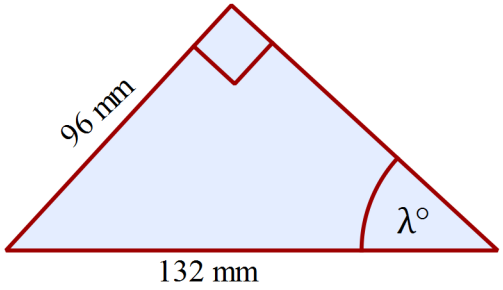
8. Find the length of BC correct to one decimal place.

A. 11.9 cm
B. 21.5 cm
C. 28.1 cm
D. 44.4 cm



9. What is the value of λ ?

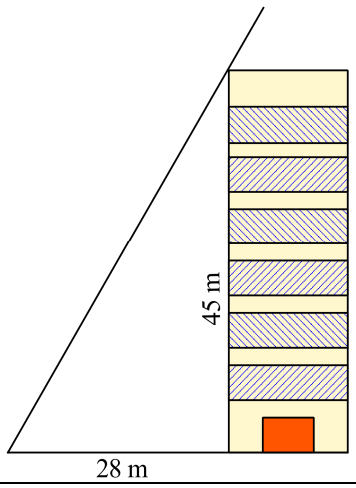
A. 36 °
B. 38 °
C. 43 °
D. 47°



10. At a certain time of day, a building which is 45 m tall, casts a shadow which is 28 m long.

What is the angle of elevation of the sun at this time?

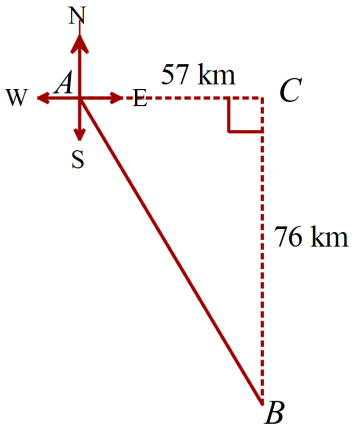
A. 31°
B. 38 °
C. 51 °
D. 58 °



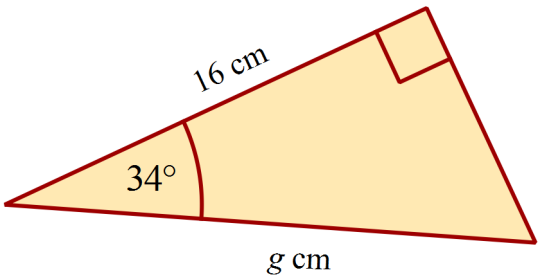
11. $AC = 57$ km and $BC = 76$ km.

What is the bearing of B from A?

A. 034°
B. 139 °
C. 143 °
D. 233 °



12. What is the value of g?



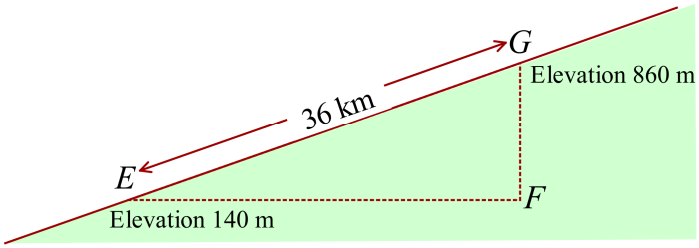
A. $g = 10.8$
B. $g = 19.3$
C. $g = 23.7$
D. $g = 28.6$

13. Two towns E and G lie in a straight line which runs up the slope of a hill.

The towns E and G are 36 km apart.

Town E has an elevation of 140 m above sea level and G has an elevation of 860 m.

What is the slope of the hill?

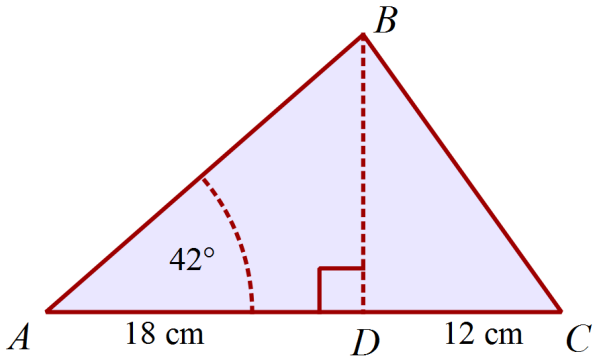


A. 1°
B. 11°
C. 52°
D. 88°

14. In ΔABC, $\angle BAC = 42°$.

D is a point on AC such that $AD = 18$ cm and $DC = 12$ cm.

What is the area of ΔABC.



A. 243.1 cm^3
B. 299.9 cm^3
C. 363.3 cm^3
D. 403.5 cm^3

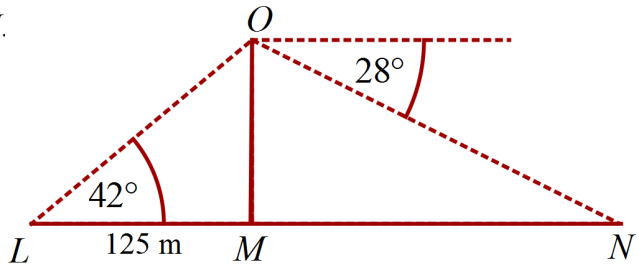
15. Points L, M and N lie in a straight line on level ground.

L is 125 m from the base of a vertical tower OM.

The angle of elevation of O from L is 42°.

The angle of depression of N from O is 28°.

How far is L from N?



A. 185 m
B. 214 m
C. 337 m
D. 399 m

High School
Mathematics Test 2015

Multiple Choice Answer Sheet

Right Triangle Trigonometry

Name _____

Completely fill the response oval representing the most correct answer.

1.	A ⬭	B ⬭	C ⬭	D ⬭
2.	A ⬭	B ⬭	C ⬭	D ⬭
3.	A ⬭	B ⬭	C ⬭	D ⬭
4.	A ⬭	B ⬭	C ⬭	D ⬭
5.	A ⬭	B ⬭	C ⬭	D ⬭
6.	A ⬭	B ⬭	C ⬭	D ⬭
7.	A ⬭	B ⬭	C ⬭	D ⬭
8.	A ⬭	B ⬭	C ⬭	D ⬭
9.	A ⬭	B ⬭	C ⬭	D ⬭
10.	A ⬭	B ⬭	C ⬭	D ⬭
11.	A ⬭	B ⬭	C ⬭	D ⬭
12.	A ⬭	B ⬭	C ⬭	D ⬭
13.	A ⬭	B ⬭	C ⬭	D ⬭
14.	A ⬭	B ⬭	C ⬭	D ⬭
15.	A ⬭	B ⬭	C ⬭	D ⬭

Year 9

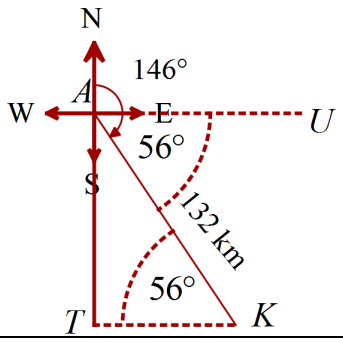
Right Triangle Trigonometry

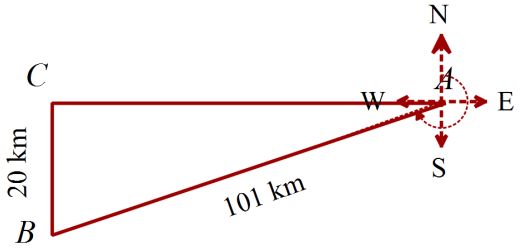
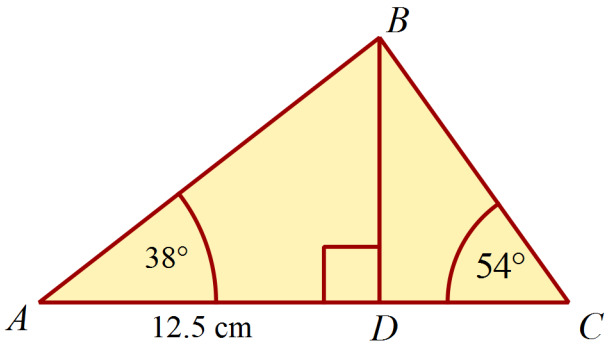
Calculator

Section 1 Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	$\sin\theta = \frac{O}{H} = \frac{5}{13}$	$\frac{5}{13}$
2.	$5 \times \cos 55° = 2.867882181$ $= 2.868$	2.868
3.	$\cos\alpha = \frac{14}{25}$ $\alpha = \cos^{-1}\frac{14}{25}$ $= 55.9442$ $= 56°$ (nearest degree)	56°
4.	$\cos 56° = \frac{x}{180}$ $x = 180 \times \cos 56°$ $= 100.654722624734429428887706519748$ $= 101$ cm (nearest cm)	$x = 101$
5.	$\tan \angle A = \frac{15}{18}$ $= 39.80557$ $= 40°$ (nearest degree)	40°
6.	$\tan 38° = \frac{w}{15}$ $x = 15 \times \tan 38°$ $= 11.7192$ $= 11.7$ cm (1 dec place)	11.7 cm
7.	$\sin\varphi = \frac{15}{20}$ $\varphi = \sin^{-1}\left(\frac{15}{20}\right)$ $= 48.590377890729140661519497813074$ $= 49°$ (nearest degree)	49°

8.	$\sin 42° = \frac{k}{24}$ $k = 24 \times \sin 42°$ $= 16.05913455$ $k =$ 16.1 cm (one decimal place)	16.1
9.	$\cos \omega = \frac{1.8}{2.5}$ $\omega = \cos^{-1}(0.72)$ $= 43.9455$ $=$ 44° (nearest degree)	44°
10.	$\cos 22° = \frac{y}{12.8}$ $y = 12.8 \times \cos 22°$ $= 11.867953$ $=$ 11.9 cm (3 sign fig)	11.9 cm
11.	$\tan 72° = \frac{h}{25}$ $h = 25 \times \tan 72°$ $= 76.942088429381335064257264400923$ $=$ 76.9 m (nearest 10th m)	76.9 m
12.	$\angle UAK = 146 - 90 = 56°$ $\angle AKT =$ 56° (alternate angles) $\cos 56°° = \frac{TK}{132}$ $TK = 132 \times \cos 56°$ $= 73.81346$ $=$ 74 km (nearest km) 	74 km

13.	$\sin A = \frac{20}{101}$ $A = \sin^{-1}\left(\frac{20}{101}\right)$ $= 11.4211$ $= 11°$ Bearing $= 270° - 11°$ $= 259°$  	259°
14.	$\sin 33° = \frac{65}{XY}$ $XY = \frac{65}{\sin 33°}$ $= 119.345$ $XY =$ 119.3 cm (one decimal place)	119.3 cm
15.	$\tan 38° = \frac{BD}{12.5}$ $BD = 12.5 \times \tan^{38}°$ $= 9.7660703$ $BD =$ 9.8 cm (one decimal place)  $\tan 54° = \frac{BD}{DC}$ $DC = \frac{BD}{\tan 54°}$ $= \frac{9.8}{\tan 54°}$ $DC = 7.0954654272055331217395777261792$ $= 7.1$ cm	7.1 cm

Year 9

Right Triangle Trigonometry

Calculator Allowed

Section 2 Multiple Choice Section

ANSWERS

No.	WORKING	ANSWER
1.	$8 \times \tan 69° = 20.8407$ $= 20.84$ (correct to 2 decimal places)	D
2.	In diagram C, $\cos X = \frac{39}{65}$, as 39 is adjacent to X and 65 is the hypotenuse.	C
3.	$\sin \beta = \frac{O}{H} = \frac{a}{b}$	A
4.	$\tan U = \frac{45}{24}$ $U = \tan^{-1} \frac{45}{24}$ $= 61.92751$ $= 62°$ Can be done using cos or sin as well.	D
5.	$\tan 25° = \frac{p}{4.25}$ $p = 4.25 \times \tan 25°$ $= 1.981807547$ $= 1.98$ (2 dec places)	B
6.	$\sin 60° = \frac{d}{1.6}$ $d = 1.6 \times \sin 60°$ $= 1.3856406$ $= 1.4$ (1 dec place)	B
7.	$\cos G = \frac{8.6}{12.5}$ $G = \cos^{-1} \frac{8.6}{12.5}$ $= 46.5280007$ $= 47°$	C

8.	$\cos 61° = \frac{BC}{24.6}$ $BC = 24.6 \times \cos 61°$ $= 11.926316658059890915254338711428$ $= 11.9$ (1 dec place)	A
9.	$\sin \lambda = \frac{96}{132}$ $\lambda = \sin^{-1} \frac{96}{132}$ $= 46.6582417$ $= 47°$	D
10.	$\tan \theta = \frac{45}{28}$ $\theta = \tan^{-1} \frac{45}{28}$ $= 58.1092$ $= 58°$	D
11.	$\tan A = \frac{76}{57}$ $A = \tan^{-1} \frac{76}{57}$ $= 53.1301$ $= 53°$ Bearing $= 90 + 53$ $= 143°$	C
12.	$\cos 34° = \frac{16}{g}$ $g = \frac{16}{\cos 34°}$ $= 19.29948$ cm $g = 19.3$ (one decimal place)	B
13.	Difference in elevation $= 860 - 140 = 720\ m = 0.72$ km $\sin \theta = \frac{0.72}{36}$ $\theta = \sin^{-1} (0.02)$ $= 1.145991998388592546510775508 28$ $= 1°$	A

14.	In ΔABD $\tan 42° = \frac{BD}{18}$ $BD = 18 \tan 42°$ $= 16.20727$ $= 16.2$ (1 dec pl) BD is height of ΔABC and base is $18 + 12 = 30$ cm Area $= \frac{1}{2} \times 30 \times 16.2$ $= 243.10$ $= 243.1 \text{ cm}^3$	A
15.	$\tan 42° = \frac{OM}{125}$ $OM = 125 \times \tan 42°$ $= 112.55050$ $= 112.5$ m $\angle N = 28°$ (alt $\angle$) $\tan 28° = \frac{112.5}{MN}$ $MN = \frac{112.5}{\tan 28°}$ $= 211.676714451977333965217094605 42$ $= 211.7$ $LN = 211.7 + 125$ $= 336.67$	C

High School
Mathematics Test 2015

Multiple Choice Answer Sheet

Right Triangle Trigonometry

Name _____ANSWERS_____

Completely fill the response oval representing the most correct answer.

1.	A ○	B ○	C ○	D ●
2.	A ○	B ○	C ●	D ○
3.	A ●	B ○	C ○	D ○
4.	A ○	B ○	C ○	D ●
5.	A ○	B ●	C ○	D ○
6.	A ○	B ●	C ○	D ○
7.	A ○	B ○	C ●	D ○
8.	A ●	B ○	C ○	D ○
9.	A ○	B ○	C ○	D ●
10.	A ○	B ○	C ○	D ●
11.	A ○	B ○	C ●	D ○
12.	A ○	B ●	C ○	D ○
13.	A ●	B ○	C ○	D ○
14.	A ●	B ○	C ○	D ○
15.	A ○	B ○	C ●	D ○