Trigonometry of the non-right angled triangle

UNIT 1: Review of right angled triangle trigonometry

QUESTION 1 Evaluate correct to three decimal places.

a $\sin 75° =$ _____ **b** $\tan 34° =$ _____ **c** $\cos 120° =$ _____

d $\tan 65°07' =$ _____ **e** $\cos 105°36' =$ _____ **f** $\sin 160°23' =$ _____

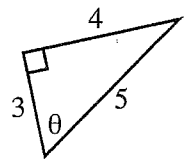
QUESTION 2 If $0° \quad \theta \quad 90°$, find θ to the nearest minute.

a $\sin\theta = 0.5$ _____ **b** $\cos\theta = 0.729$ _____ **c** $\tan\theta = 2.715$ _____

d $\cos\theta = 0.89$ _____ **e** $\tan\theta = 1.36$ _____ **f** $\sin\theta = 0.2588$ _____

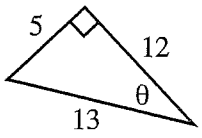
QUESTION 3 Complete the trigonometric ratios for the following triangles.

a



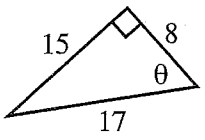
$\sin\theta =$ ____
$\cos\theta =$ ____
$\tan\theta =$ ____

b



$\sin\theta =$ ____
$\cos\theta =$ ____
$\tan\theta =$ ____

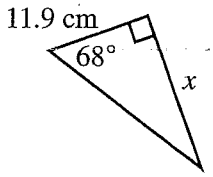
c



$\sin\theta =$ ____
$\cos\theta =$ ____
$\tan\theta =$ ____

QUESTION 4 Find the value of the unknown side x correct to one decimal place.

a



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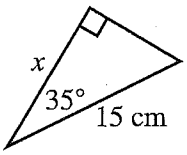
b



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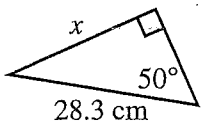
c



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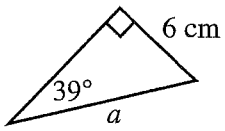
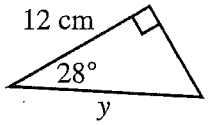
QUESTION 5 Find the length of the hypotenuse correct to two decimal places.

a



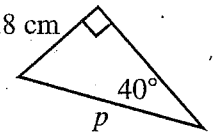
_____

b



_____

c



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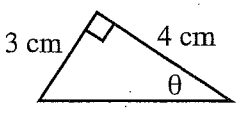
QUESTION 6 Find the size of angle θ to the nearest minute.

a



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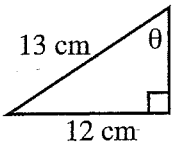
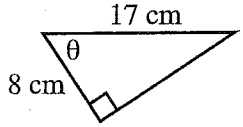
b



_____

c



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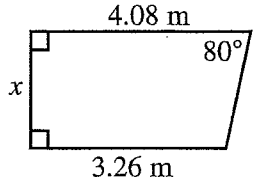
QUESTION 7 Calculate the value of the pronumeral in the following.

a



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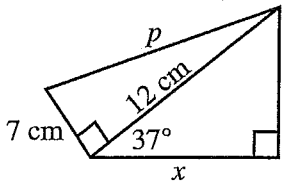
b



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Trigonometry of the non-right angled triangle

UNIT 2: Trigonometric ratios for angles of any magnitude

QUESTION 1 Use your calculator to evaluate the following correct to two decimal places.

a $\sin 150° =$ _____ **b** $\cos 130° =$ _____ **c** $\tan 210° =$ _____

d $\cos 131°52' =$ _____ **e** $\cos 170°16' =$ _____ **f** $\sin 300° =$ _____

g $\dfrac{5}{\sin 130°} \times \sin 28° =$ _____ **h** $\dfrac{10 \times \sin 135°}{15.6} =$ _____ **i** $\dfrac{\tan 300°}{16.5} =$ _____

QUESTION 2 If $0° \quad \theta \quad 180°$, find θ to the nearest minute.

a $\sin\theta = 0.866$ _____ **b** $\cos\theta = 0.75$ _____ **c** $\cos\theta = -0.5$ _____

d $\cos\theta = -0.82$ _____ **e** $\tan\theta = 1.782$ _____ **f** $\tan\theta = -1.217$ _____

QUESTION 3 Find the angles in the first and second quadrants, whose:

a sin is 0.8235 _____ **b** cos is –0.5321 _____

c tan is 0.7685 _____ **d** tan is –1.6328 _____

QUESTION 4 Find the angles in the third and fourth quadrants, whose:

a sin is –0.6827 _____ **b** cos is 0.5 _____

c tan is –2.5706 _____ **d** tan is –1.7563 _____

QUESTION 5 Use your calculator to find the sin, cos and tan of the following angles correct to four decimal places.

a 120°; $\sin 120° =$ _____, $\cos 120° =$ _____, $\tan 120° =$ _____

b 198°; $\sin 198° =$ _____, $\cos 198° =$ _____, $\tan 198° =$ _____

c 300°; $\sin 300° =$ _____, $\cos 300° =$ _____, $\tan 300° =$ _____

d 70°; $\sin 70° =$ _____, $\cos 70° =$ _____, $\tan 70° =$ _____

e 290°; $\sin 290° =$ _____, $\cos 290° =$ _____, $\tan 290° =$ _____

f 320°; $\sin 320° =$ _____, $\cos 320° =$ _____, $\tan 320° =$ _____

QUESTION 6 An angle A is in the second quadrant. If $\sin A = 0.75$, find $\cos A$ and $\tan A$.

_____

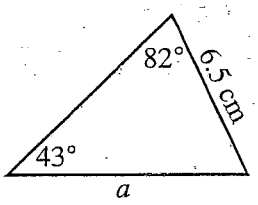
_____

Trigonometry of the non-right angled triangle

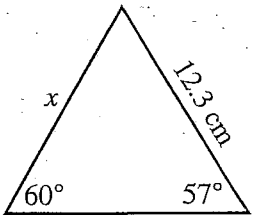
UNIT 3: The sine rule

QUESTION 1 Use the sine rule to find the value of the unknown side correct to two decimal places.

a

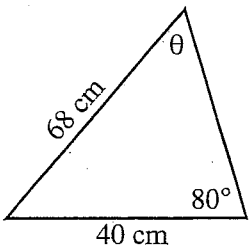


b

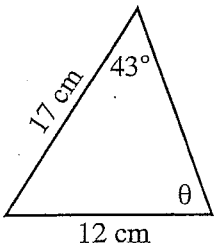


QUESTION 2 In the following triangles, find angle θ to the nearest degree.

a



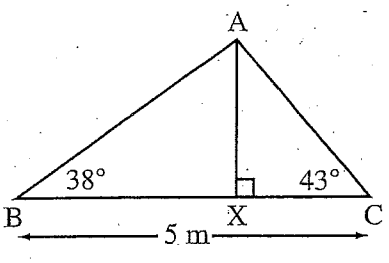
b



QUESTION 3 In the figure (not drawn to scale), $\angle B = 38°$, $\angle C = 43°$ and $BC = 5$ m. The perpendicular from A to BC meets BC at X.

a Using the sine rule for ΔABC, find length AC.

b Hence find the length AX in metres, correct to two decimal places.



QUESTION 4 By using the sine rule, find the unknown sides and angles in the following triangles ABC.

a $\angle A = 75°$, $\angle B = 35°$, $a = 12.5$ cm

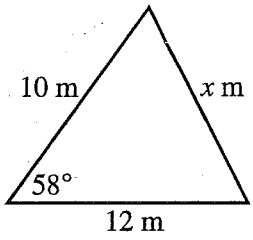
b $\angle A = 58°26'$, $\angle B = 61°32'$, $c = 12.2$ cm

Trigonometry of the non-right angled triangle

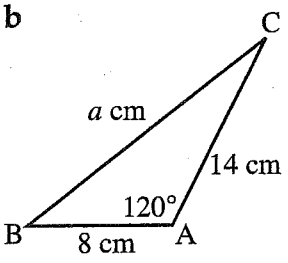
UNIT 4: The cosine rule

QUESTION 1 Use the cosine rule to find the value of the unknown side correct to two decimal places.

a

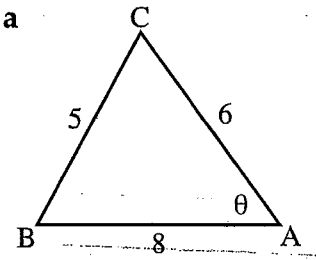


b

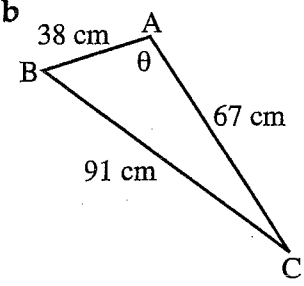


QUESTION 2 In the following triangles, find angle θ to the nearest degree.

a



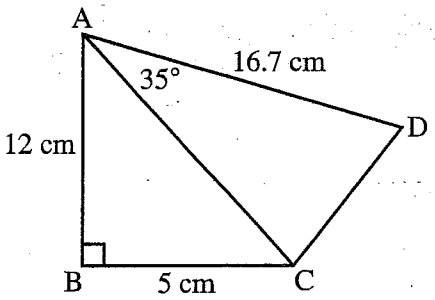
b



QUESTION 3 In the given diagram:

a Use Pythagoras' theorem to find the length AC.

b Use the cosine rule to calculate the length of CD correct to two decimal places.



QUESTION 4 By using the cosine rule, find the unknown sides and angles in the following triangles ABC.

a $a = 10$ cm, $b = 12$ cm, $\angle C = 60°$

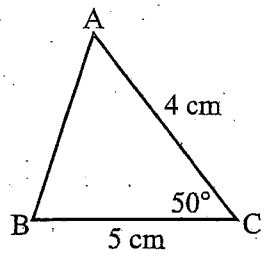
b $a = 6$ m, $b = 8$ m, $c = 6.5$ m

Trigonometry of the non-right angled triangle

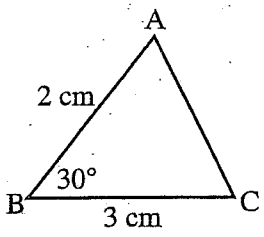
UNIT 5: The area of a triangle

QUESTION 1 Find the area of each of the following triangles to the nearest square centimetre.

a

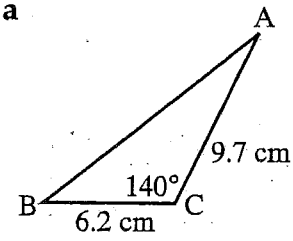


b

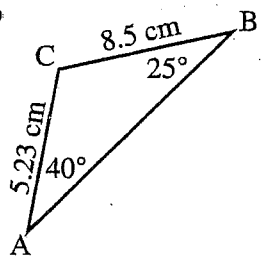


QUESTION 2 Find the area of the following obtuse angled triangles to the nearest square centimetre.

a

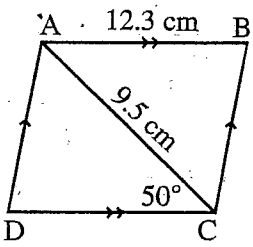


b

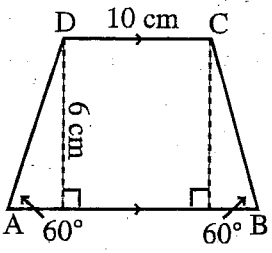


QUESTION 3

a Find the area of the parallelogram ABCD.



b Find the area of the trapezium ABCD.



QUESTION 4 Find the areas of the following triangles.

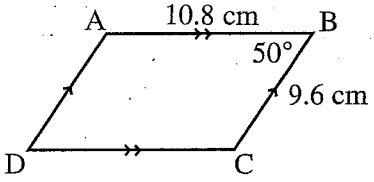
a $a = 8$ cm, $b = 10$ cm, $\angle C = 120°$

b $\angle A = 145°$, $b = 9.3$ cm, $c = 12.5$ cm

Trigonometry of the non-right angled triangle

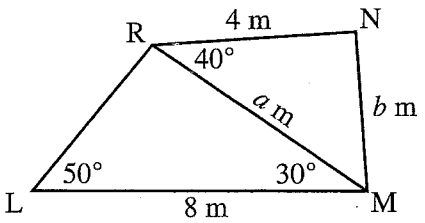
UNIT 6: Miscellaneous questions

QUESTION 1 Find the area of the parallelogram shown.



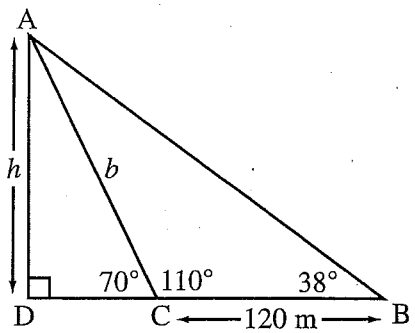
QUESTION 2 In ΔABC, $a = 2.5$ cm, $b = 3$ cm and $c = 4$ cm. Find $\angle A$ correct to the nearest degree.

QUESTION 3 In the figure below (not drawn to scale), $LM = 8$ m, $NR = 4$ m, $\angle RLM = 50°$, $\angle RML = 30°$, $\angle NRM = 40°$, $RM = a$ metres and $MN = b$ metres. Use the sine rule to find a and the cosine rule to find b (correct to one decimal place).



QUESTION 4

a By using the information given in the diagram and the sine rule in ΔABC, show that $b = \dfrac{120\sin 38°}{\sin 32°}$.



b Hence find the value of b correct to two decimal places.

c Use the right angled ΔADC to find the value of h correct to two decimal places.

UNIT 7: TOPIC TEST

SECTION 1

Trigonometry of the non-right angled triangle

Instructions for SECTION 1

- You have 15 minutes to answer Section 1
- Each question is worth 2 marks
- Attempt ALL questions
- Calculators are NOT to be used
- Fill in only ONE CIRCLE for each question

Marks

1 Find the value of a correct to two decimal places if $\frac{a}{\sin 50°} = \frac{8}{\sin 60°}$.

Ⓐ 12.06 Ⓑ 8.71 Ⓒ 7.08 Ⓓ 9.80 — 2

2 If $\sin A = \frac{25\sin 65°}{36}$, find $\angle A$ to the nearest degree.

Ⓐ 30° Ⓑ 39° Ⓒ 47° Ⓓ 62° — 2

3 Find the value of a, correct to one decimal place, if $a^2 = 8^2 + 9^2 - 2 \times 8 \times 9\cos 85°$.

Ⓐ 11.5 Ⓑ 6.3 Ⓒ 7.8 Ⓓ 12.3 — 2

4 Find the size of angle A, correct to the nearest degree, if $\cos A = \frac{5^2 + 6^2 - 7^2}{2 \times 5 \times 6}$.

Ⓐ 89° Ⓑ 38° Ⓒ 49° Ⓓ 78° — 2

5 Find the size of angle A, correct to the nearest degree, if $\cos A = \frac{8.3^2 + 9.5^2 - 11.2^2}{2 \times 8.3 \times 9.5}$.

Ⓐ 78° Ⓑ 84° Ⓒ 28° Ⓓ 64° — 2

6 In ΔABC, $\angle B = 65°$, $\angle C = 42°$ and $AC = 6.8$ cm. Use the sine rule to calculate AB.

Ⓐ 4.13 cm Ⓑ 5.81 cm Ⓒ 6.32 cm Ⓓ 5.02 cm — 2

7 In ΔLMN, $LM = 8$ m, $LN = 10$ m and $\angle LMN = 48°$. Use the sine rule to find $\angle LNM$ to the nearest degree.

Ⓐ 33° Ⓑ 36° Ⓒ 58° Ⓓ 72° — 2

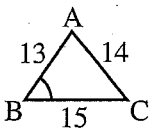
8 Find $\angle A$ to the nearest degree if $\frac{5}{\sin A} = \frac{7}{\sin 70°}$.

Ⓐ 40° Ⓑ 42° Ⓒ 50° Ⓓ 22° — 2

9 In ΔABC, $a = 4.5$, $b = 5.2$ and $c = 6$. Use the cosine rule to find $\angle C$ to the nearest degree.

Ⓐ 76° Ⓑ 56° Ⓒ 29° Ⓓ 93° — 2

10 In the given triangle ABC, find $\angle B$ to the nearest degree.



Ⓐ 54° Ⓑ 59° Ⓒ 61° Ⓓ 83° — 2

Total marks achieved for SECTION 1 ___/20

UNIT 7: TOPIC TEST

SECTION 2

Page 8

Trigonometry of the non-right angled triangle

Instructions for SECTION 2

- You have 20 minutes to answer ALL of Section 2
- Each question is worth 2 marks
- Attempt ALL questions
- Calculators may be used

Questions	Answers	Marks
Use your calculator to find the following.		
1 $8\sin30°$	_____	2
2 $2.5\cos49°$	_____	2
3 $6.83\tan37°$	_____	2
4 $\frac{\sin63°}{18.3}$	_____	2
5 $\frac{2.36}{\cos31°}$	_____	2
6 $\tan62° \div 100$	_____	2
7 $12.67 \div (\tan32°)$	_____	2
8 $8\sin25° - 3\cos48°$	_____	2
9 The angle A is in the second quadrant. If $\sin A = 0.5$, find $\cos A$.	_____	2
10 If $\sin A = 0.2482$, find all values of A from 0° to 360°.	_____	2
Find the areas of the following triangles.		
11 $a = 5$ cm, $b = 9$ cm and $\angle C = 125°$.	_____	2
12 $b = 6.5$ cm, $c = 14.5$ cm and $\angle A = 140°$.	_____	2
Solve the following triangles by using the sine rule.		
13 $\angle A = 80°$, $\angle B = 28°$ and $a = 12.5$ cm.	_____	2
14 $a = 9$ m, $c = 13$ m and $\angle C = 25°$.	_____	2
15 $a = 9$ cm, $b = 14$ cm and $\angle C = 75°$.	_____	2

Total marks achieved for SECTION 2 ____/30

Answers

Page 1 1 a 0.966 b 0.675 c −0.5 d 2.156 e −0.269 f 0.336 2 a 30° b 43°11′ c 69°46′ d 27°7′ e 53°40′ f 15° 3 a $\sin\theta = \frac{4}{5}, \cos\theta = \frac{3}{5}, \tan\theta = \frac{4}{3}$ b $\sin\theta = \frac{5}{13}, \cos\theta = \frac{12}{13}, \tan\theta = \frac{5}{12}$ c $\sin\theta = \frac{15}{17}, \cos\theta = \frac{8}{17}, \tan\theta = \frac{15}{8}$ 4 a 29.5 cm b 12.3 cm c 21.7 cm 5 a 9.53 cm b 13.59 cm c 10.58 cm 6 a 36°52′ b 67°23′ c 61°56′ 7 a $x = 4.65$ m b $x = 9.58$ cm, $p = 13.89$ cm

Page 2 1 a 0.5 b −0.64 c 0.58 d −0.67 e −0.17 f −0.87 g 3.06 h 0.45 i −0.10 2 a 60°, 120° b 41°25′ c 120° d 145°05′ e 60°42′ f 129°25′ 3 a 55°26′, 124°34′ b 122°09′ c 37°33′ d 121°29′ 4 a 223°03′, 316°57′ b 300° c 291°15′ d 299°39′ 5 a $\sin 120° = 0.8660$, $\cos 120° = -0.5$, $\tan 120° = -1.7320$ b $\sin 198° = -0.3090$, $\cos 198° = -0.9511$, $\tan 198° = 0.3249$ c $\sin 300° = -0.8660$, $\cos 300° = 0.5$, $\tan 300° = -1.7321$ d $\sin 70° = 0.9397$, $\cos 70° = 0.3420$, $\tan 70° = 2.7475$ e $\sin 290° = -0.9397$, $\cos 290° = 0.3420$, $\tan 290° = -2.7475$ f $\sin 320° = -0.6428$, $\cos 320° = 0.7660$, $\tan 320° = -0.8391$ 6 −0.6614, −1.1339

Page 3 1 a 9.44 cm b 11.91 cm 2 a 35° b 75° 3 a 3.12 m b 2.13 m 4 a $\angle C = 70°$, $b = 7.42$ cm, $c = 12.16$ cm b $\angle C = 60°02'$, $a = 12$ cm, $b = 12.4$ cm

Page 4 1 a 10.81 m b 19.29 cm 2 a 39° b 117° 3 a 13 cm b 9.6 cm 4 a $c = 11.1$ cm, $\angle A = 51°17'$, $\angle B = 68°43'$ b $\angle A = 47°31'$, $\angle B = 79°28'$, $\angle C = 53°01'$

Page 5 1 a 7.7 cm² b 1.5 cm² 2 a 19.3 cm² b 20.1 cm² 3 a 89.5 cm² b 80.8 cm² 4 a 34.6 cm² b 33.3 cm²

Page 6 1 79.4 cm² 2 39° 3 a 6.2 m b 4.1 m 4 b 139.42 m c 131.01 m

Page 7 1 C 2 B 3 A 4 D 5 A 6 D 7 B 8 B 9 A 10 B

Page 8 1 4 2 1.6401 3 5.1468 4 0.0487 5 2.7533 6 0.0188 7 20.2762 8 1.3736 9 −0.8660 10 14°22′, 165°38′ 11 18.4 cm² 12 30.3 cm² 13 $\angle C = 72°$, $b = 5.96$ cm, $c = 12.07$ cm 14 $\angle A = 17°$, $\angle B = 138°$, $b = 20.58$ m 15 $\angle A = 36°33'$, $\angle B = 68°27'$, $c = 14.6$ cm