

TRIGONOMETRY

MATHEMATICS GRADE 10

REVISION PACK

PAST PAPERS

JANUARY 1, 2018

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QUESTION 6 (MAY 07 BISHOP)

Determine the value of each of the following by using a calculator.
Answers should be given correct to TWO decimal places.

6.1 $\sin 75^\circ - \cos 42^\circ$ _____

6.2 $\frac{\tan 49^\circ}{3}$ _____

6.3 $3 \cos(x - 15^\circ)$ where $x = 45^\circ$ _____

6.4 $\sin^2 27^\circ + \cos^2 27^\circ$ _____

6.5 $2 \cos\left(\frac{49^\circ}{2}\right)$ _____ [5]

QUESTION 7

Solve for x , correct to ONE decimal place:

7.1 $\sin x = 0,798$ (1)

7.2 $2 \tan x + 1 = 3$ (3)

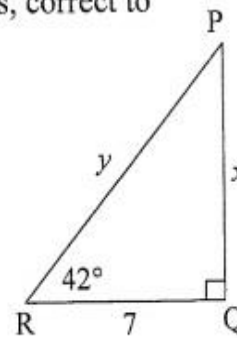
7.3 $4 \cos 2x = 2$ (3)

7.4 $3 \sin(x - 10^\circ) = 1$ (3)
[11]

QUESTION 8

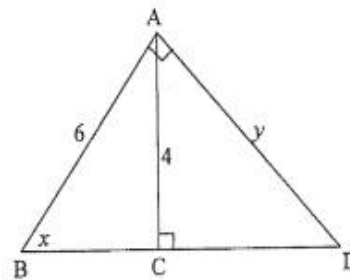
Find the value of x and y in each of the following cases, correct to TWO decimal places:

8.1



(6)

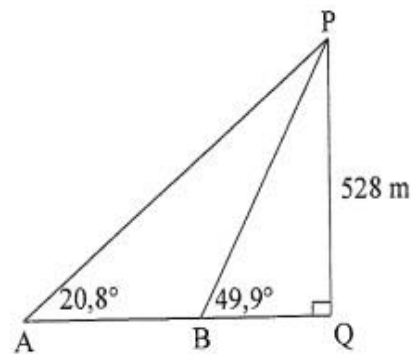
8.2



(6)
[12]

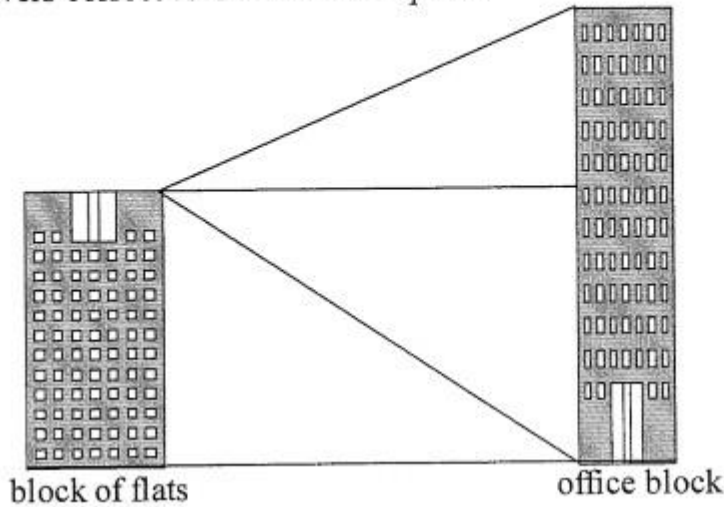
QUESTION 9

9.1 Find the length of AB in the figure below, correct to TWO decimal places:



(7)

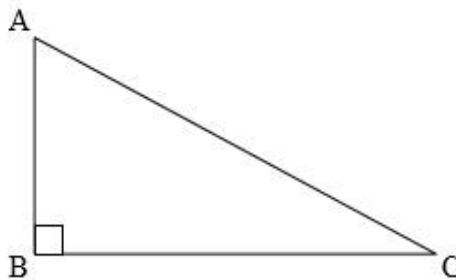
- 9.2 An office block is located 100m from a block of flats. From the top of the block of flats the angle of elevation to the top of the office block is 25° and the angle of depression to the bottom of the office block is 39° .
Answers correct to ONE decimal place.



- 9.2.1 Write in the given angles and lengths in the figure above (1)
- 9.2.2 Find the height of the block of flats (3)
- 9.2.3 Find the height of the office block (4)
- [15]

QUESTION 4 (EXEMPLAR 12)

- 4.1 In the diagram below, $\triangle ABC$ is right-angled at B.

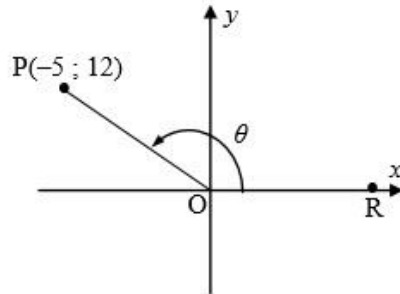


Complete the following statements:

- 4.1.1 $\sin C = \frac{AB}{\dots}$ (1)
- 4.1.2 $\dots A = \frac{AB}{BC}$ (1)

4.2 Without using a calculator, determine the value of: $\frac{\sin 60^\circ \cdot \tan 30^\circ}{\sec 45^\circ}$ (4)

4.3 In the diagram, $P(-5 ; 12)$ is a point in the Cartesian plane and $\hat{R}OP = \theta$.



Determine the value of:

4.3.1 $\cos \theta$ (3)

4.3.2 $\operatorname{cosec}^2 \theta + 1$ (3)
[12]

QUESTION 5

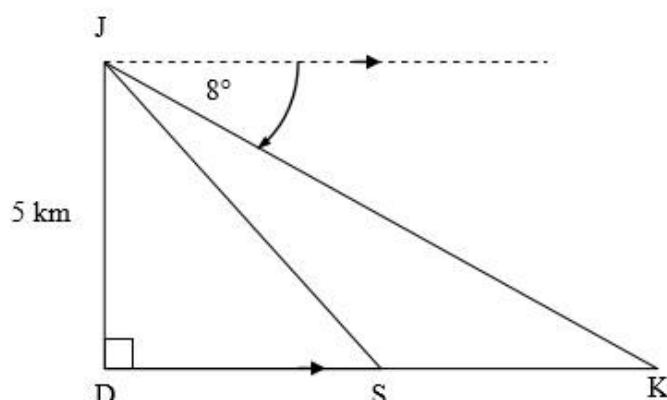
5.1 Solve for x , correct to ONE decimal place, in each of the following equations where $0^\circ \leq x \leq 90^\circ$.

5.1.1 $5 \cos x = 3$ (2)

5.1.2 $\tan 2x = 1,19$ (3)

5.1.3 $4 \sec x - 3 = 5$ (4)

- 5.2 An aeroplane at J is flying directly over a point D on the ground at a height of 5 kilometres. It is heading to land at point K. The angle of depression from J to K is 8° . S is a point along the route from D to K.

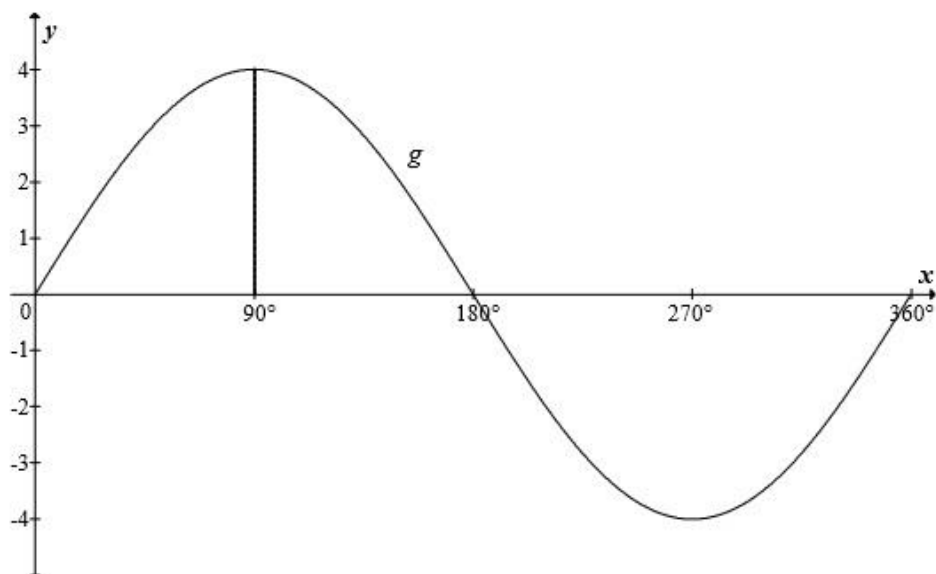


- 5.2.1 Write down the size of \hat{JKD} . (1)
- 5.2.2 Calculate the distance DK, correct to the nearest metre. (3)
- 5.2.3 If the distance SK is 8 kilometres, calculate the distance DS. (1)
- 5.2.4 Calculate the angle of elevation from point S to J, correct to ONE decimal place. (2)
- [16]**

QUESTION 6

- 6.1 Consider the function $y = 2 \tan x$.
- 6.1.1 Make a neat sketch of $y = 2 \tan x$ for $0^\circ \leq x \leq 360^\circ$ on the axes provided on DIAGRAM SHEET 1. Clearly indicate on your sketch the intercepts with the axes and the asymptotes. (4)
- 6.1.2 If the graph of $y = 2 \tan x$ is reflected about the x -axis, write down the equation of the new graph obtained by this reflection. (1)

6.2 The diagram below shows the graph of $g(x) = a \sin x$ for $0^\circ \leq x \leq 360^\circ$.



6.2.1 Determine the value of a . (1)

6.2.2 If the graph of g is translated 2 units upwards to obtain a new graph h , write down the range of h . (2)
[8]

QUESTION 5 (JUNE 12 HUD)

5.1. Evaluate the following expressions, if $\theta = 25^\circ$:

- 5.1.1. $\tan 3\theta - 10$ 2
 5.1.2. $\sin^2\theta + \cos^2\theta$ 2 (4)

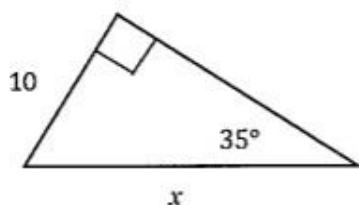
5.2. Solve for θ :

- 5.2.1. $\cos \theta = 0,766$ where $\theta \in [0^\circ; 90^\circ]$ 1
 5.2.2. $\frac{\sin \theta}{3} = \frac{\sin 50^\circ}{8}$ where $\theta \in [0^\circ; 90^\circ]$ 2
 5.2.3. $\tan 2(\theta + 15^\circ) = 1$ where $2(\theta + 15^\circ) \in [0^\circ; 90^\circ]$ 2 (5)

- 5.2.2. $\frac{\sin \theta}{3} = \frac{\sin 50^\circ}{8}$ where $\theta \in [0^\circ; 90^\circ]$ 2
- 5.2.3. $\tan 2(\theta + 15^\circ) = 1$ where $2(\theta + 15^\circ) \in [0^\circ; 90^\circ]$ 2 (5)

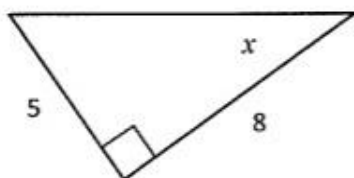
5.3. In each of the following diagrams, calculate x :

5.3.1.



2

5.3.2.



2 (4)

5.4. CALCULATORS MAY NOT BE USED IN THIS QUESTION

Given :

$$13 \cos \theta + 5 = 0 \quad \text{and} \quad 180^\circ < \theta < 360^\circ$$

- 5.4.1. Draw a diagram, in the correct quadrant, representing the given information. Clearly indicate x , y , r and θ in your diagram. 2
- 5.4.2. Now, use the diagram to evaluate $\sin \theta$. 1 (3)

5.5. CALCULATORS MAY NOT BE USED IN THIS QUESTION

5.5.1. Sketch the special diagram that is used to evaluate trigonometric ratios of :

5.5.1.1. 60° and 30°

1

5.5.1.2. 45°

1 2

5.5.2. Now, evaluate the following :

5.5.2.1. $\tan 30^\circ$

1

5.5.2.2. $\sin 45^\circ$

1 2 (4)

[20]

QUESTION 4 (NOV 12 HUD)

CALCULATORS MAY NOT BE USED IN THIS QUESTION

4.1. Given : $5 \sin \theta + 4 = 0$ and $\tan \theta > 0$.

4.1.1. Draw a diagram, in the correct quadrant, representing the given information. ALL relevant values must be shown.

3

4.1.2. Now, use your diagram to determine : $\cos \theta$.

1 (4)

4.2. If : $\cos 20^\circ = k$, where $0 < k < 1$, use a diagram to determine : $\tan 70^\circ$.

(3)

4.3.1. Sketch the special diagram used to evaluate trigonometric ratios of 30° .

1

4.3.2. Now, use (4.3.1.) to determine : $\sin 30^\circ$.

1 (2)

QUESTION 6 [7 marks]

6.1. If $x = 38^\circ$, evaluate : $\frac{\sin^2 x}{\tan x - 2 \cos x}$ (2)

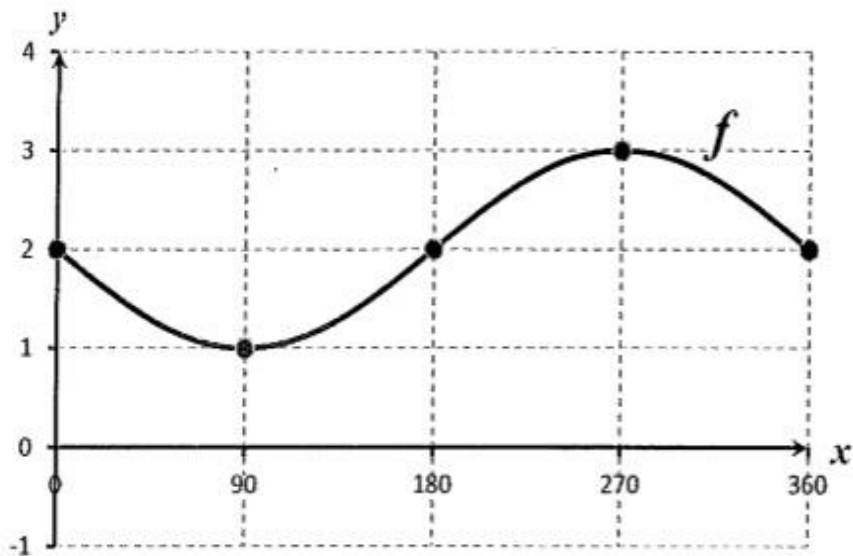
6.2. Solve for x :

6.2.1. $9^2 = 8^2 + 7^2 - 2 \cdot 8 \cdot 7 \cdot \cos x$ ($x \in [0^\circ; 90^\circ]$) 2

6.2.2. $\tan 3x + 2 = 4 \sin 75^\circ$ ($3x \in [0^\circ; 90^\circ]$) 3 (5)

QUESTION 7 [6 marks]

7.1. Sketched below is the graph of $f : x \rightarrow a \sin x - q$:



Write down the values of :

7.1.1. a 1

7.1.2. q 1 (2)

7.2. USE THE ANSWER SHEET PROVIDED

On the given set of axes, sketch a neat graph of

$$g(x) = -\tan x + 1$$

for $x \in [0^\circ; 360^\circ]$. Show all relevant details.

(4)

QUESTION 8 (JUNE 13 HUD)

8.1) $A = 64,3^\circ$ and $B = 21,87^\circ$

Determine the following

8.1.1) $\tan(A - B)$

8.1.2) $2\cos^2 B$

8.1.3) $\sin A + 10$

8.2) Determine the magnitude of A for

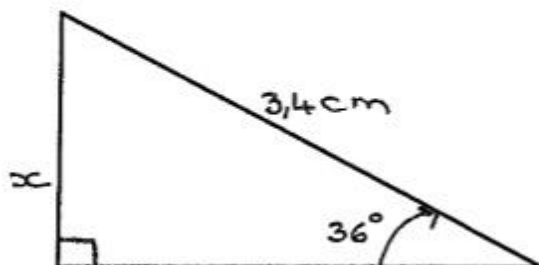
8.2.1) $\sin A = 0,866$ $0 \leq A \leq 90$ (1)

8.2.2) $3\tan A = \sin 34,62$ $0 \leq A \leq 90$ (2)

8.2.3) $\sqrt{3} + 2\cos 4(A - 10^\circ) = 0$ $0 \leq A + 10^\circ \leq 90$ (3)

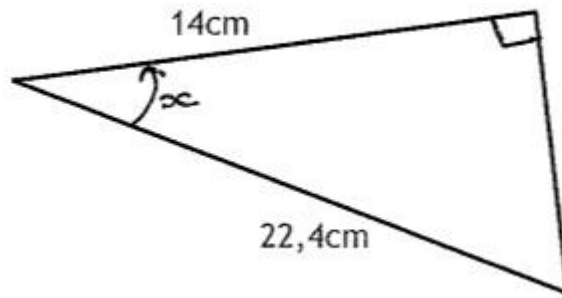
9.2) Determine the value of x in each of the following

9.2.1)



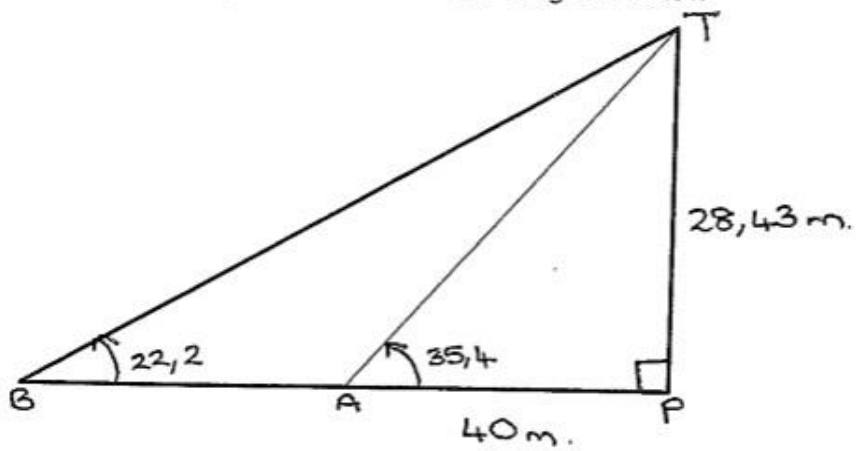
(2)

9.2.2)



(2)

9.3) From point A, 40m from a building TP the angle of elevation to the top of the building is $35,4^\circ$. From the point B, further away from the building, the angle of elevation is $22,2^\circ$. As shown in the diagram below



Determine the distance between A and B

(4)

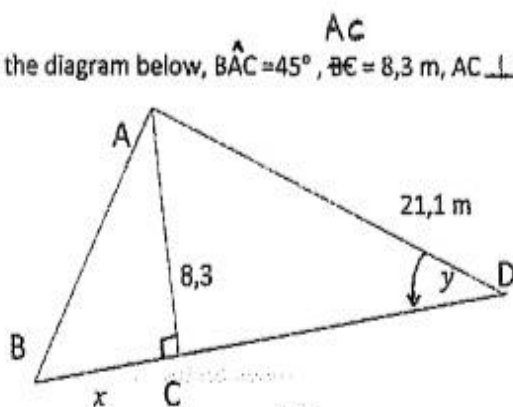
QUESTION 7 (NOV 13 HUD)

7.1 If $5 \tan \theta = 12$ and $90^\circ < \theta < 360^\circ$, determine the value of $\cos \theta$ by using a diagram and without using a calculator. (4)

7.2.1 Sketch the special diagram used to evaluate trigonometric ratios of 60° without a calculator. (1)

7.2.2 Use the diagram to evaluate $\frac{1}{\sin 60^\circ}$ without using a calculator. (2)

7.3 In the diagram below, $\hat{BAC} = 45^\circ$, $BC = 8,3$ m, $AC \perp BD$ and $AD = 21,1$ m.



Use the diagram above to calculate the size of

7.3.1 x (2)

7.3.2 y (2)

7.4 If $\cos 15^\circ = t$, use a diagram to determine $\cos 75^\circ$ (3)

7.5 Solve for x if $x \in (0; 90^\circ)$

7.5.1 $2 \tan x - 5,8 = 0$ (2)

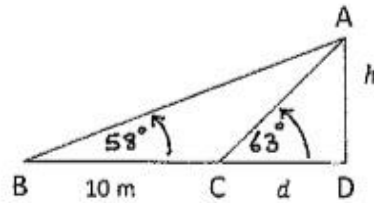
7.5.2 $4 \sin x - 3 = \cos 32^\circ$ (3)

[19]

Question 8 (9 marks)

63°

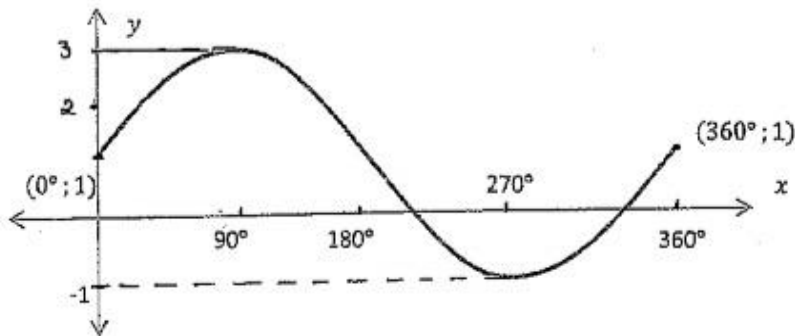
The angle of elevation from B to the top of flagpole AD is 58°. An observer walks 10 m from B to C and finds the angle of elevation of A to be 63°. Let the height of the flagpole be h meters and the distance between the flagpole and the second point of observation, C, be d meters.



- 8.1 Express h in terms of d and a ratio of 63° . (2)
- 8.2 Express h in terms of d and a ratio of 58° . (1)
- 8.3 Use your answers to 8.1 and 8.2 to show that $d = 44,17$ m. (4)
- 8.4 What is the height of the flagpole? (2) [9]

Question 9 (5 marks)

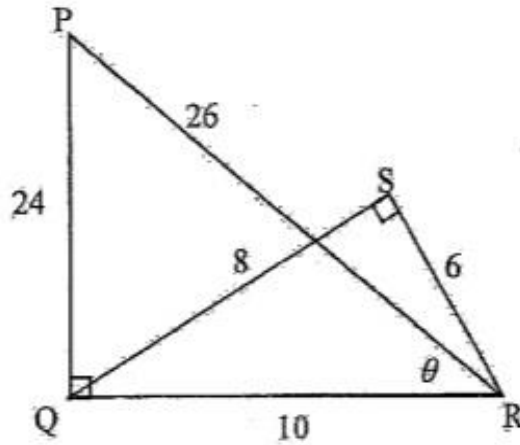
9.1 Sketched below is the graph of $f(x) = a \sin x + b$ for $x \in [0^\circ; 360^\circ]$



- Write down the values of:
- 9.1.1 a (1)
 - 9.1.2 b (1)
- 9.2 Sketch the graph of $g(x) = -\tan x$ for $x \in [0^\circ; 180^\circ]$ on the set of axes provided on Diagram Sheet A. (3) [5]

QUESTION 4 (NOV 14)

$\triangle PQR$ and $\triangle SQR$ are right-angled triangles as shown in the diagram below.
 $PR = 26$, $PQ = 24$, $QS = 8$, $SR = 6$, $QR = 10$ and $\hat{P}RQ = \theta$.



4.1 Refer to the diagram above and, WITHOUT using a calculator, write down the value of:

4.1.1 $\tan \hat{P}$ (1)

4.1.2 $\sin \hat{S}QR$ (1)

4.1.3 $\cos \theta$ (1)

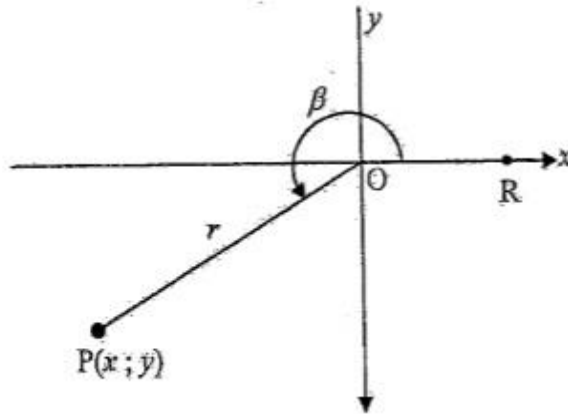
4.1.4 ~~$\sec \hat{S}RQ$~~ $\frac{1}{\cos \hat{S}RQ}$ (1)

4.2 WITHOUT using a calculator, determine the value of ~~$\frac{\cot \theta}{\operatorname{cosec} \hat{Q}RS}$~~ (3)
 [7]

$$\frac{\sin \hat{Q}RS}{\tan \theta}$$

QUESTION 5

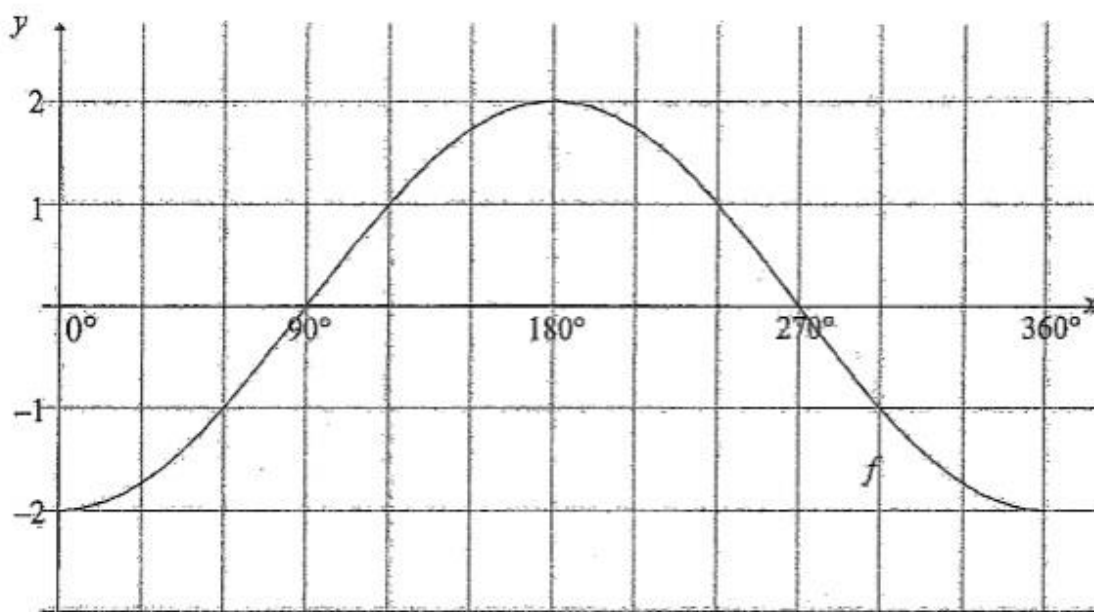
- 5.1 In the diagram below, $P(x; y)$ is a point in the third quadrant. $\widehat{R\hat{O}P} = \beta$ and $17 \cos \beta + 15 = 0$.



- 5.1.1 Write down the values of x , y and r . (4)
- 5.1.2 WITHOUT using a calculator, determine the value of:
- (a) $\sin \beta$ (1)
- (b) $\cos^2 30^\circ \cdot \tan \beta$ (3)
- 5.1.3 Calculate the size of $\widehat{R\hat{O}P}$ correct to TWO decimal places. (2)
- 5.2 In each of the following equations, solve for x where $0^\circ \leq x \leq 90^\circ$. Give your answers correct to TWO decimal places.
- 5.2.1 $\tan x = 2,22$ (2)
- 5.2.2 ~~$\sec(x + 10^\circ) = 5,759$~~ $\cos(x + 10^\circ) = 0,179$ (3)
- 5.2.3 $\frac{\sin x}{0,2} - 2 = 1,24$ (3)
- [18]

QUESTION 6

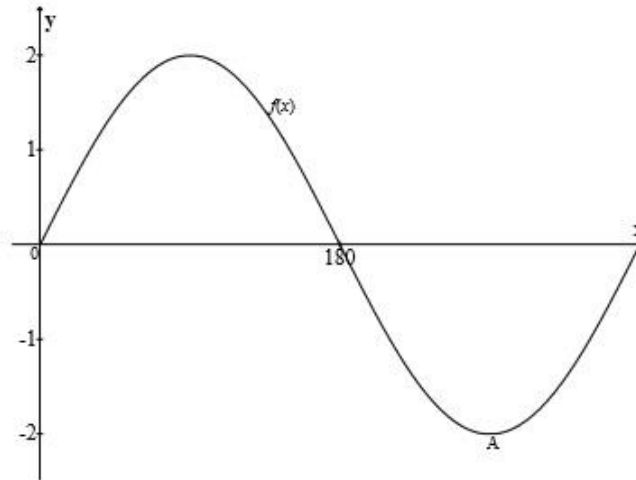
In the diagram below, the graph of $f(x) = -2 \cos x$ is drawn for the interval $0^\circ \leq x \leq 360^\circ$.



- 6.1 Write down the amplitude of f . (1)
- 6.2 Write down the minimum value of $f(x) + 3$. (1)
- 6.3 On the same system of axes, draw the graph of g , where $g(x) = \sin x + 1$ for the interval $0^\circ \leq x \leq 360^\circ$. (3)
- 6.4 Use the graphs to determine the following:
- 6.4.1 The value of $f(180^\circ) - g(180^\circ)$ (2)
- 6.4.2 For which value(s) of x will $f(x) \cdot g(x) > 0$ (2)
- 6.5 The graph of f is reflected about the x -axis and then moved 3 units downwards to form the graph of h . Determine:
- 6.5.1 The equation of h (2)
- 6.5.2 The range of h for the interval $0^\circ \leq x \leq 360^\circ$. (2)
- [13]

QUESTION 1 (EXEMPLAR?)

1.5 Alongside is the graph of the function:
 $f(x) = a \sin x$

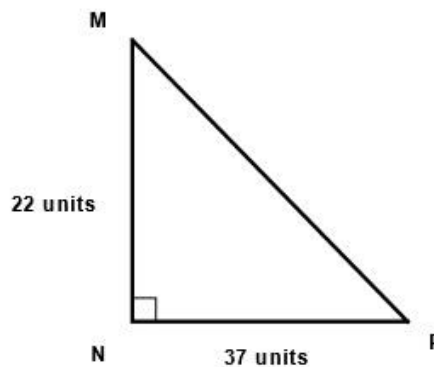


- 1.5.1 What is the value of a ? (1)
- 1.5.2 What are the coordinates of A, the turning point of the function $f(x)$ shown on the graph? (2)
- 1.5.3 What is the period of $f(x)$? (1)
- 1.5.4 What will be the new equation of $g(x)$ if $g(x)$ is obtained by shifting $f(x)$ up 1 unit? (1)

[5]

QUESTION 4 (EXEMPLAR 06)

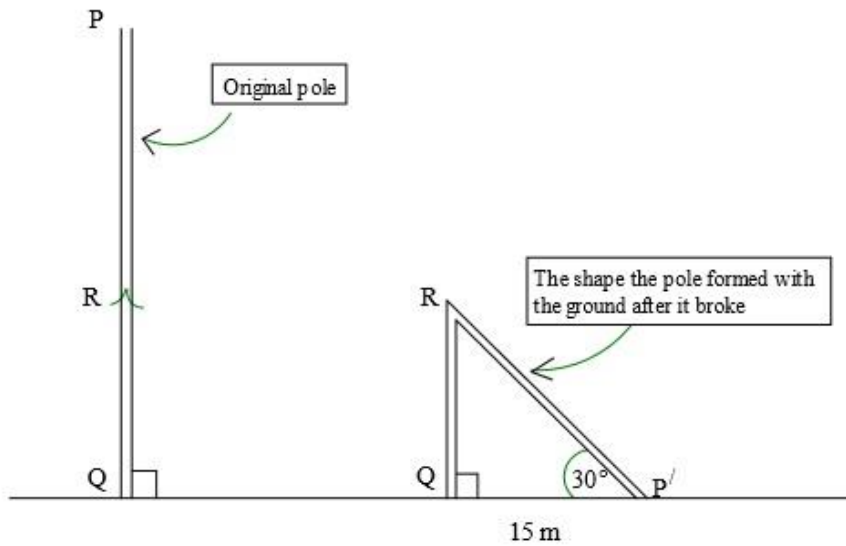
4.1 In $\triangle MNP$, $MN = 22$ units, $\hat{N} = 90^\circ$ and $NP = 37$ units. Determine \hat{P} (correct to ONE decimal place).



(3)

- 4.2 A pole PQ broke at point R which resulted in the top portion of the pole, PR, forming an angle of 30° with the ground at P' , now 15 m away from Q, the foot of the pole.

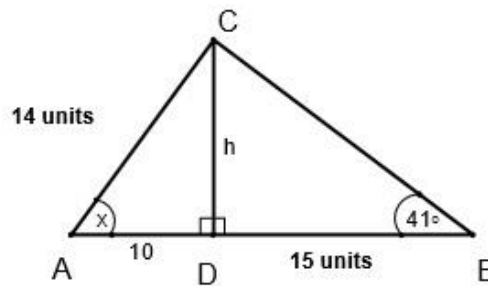
Calculate the original height PQ of the pole (correct to ONE decimal place).



(5)
[8]

QUESTION 5

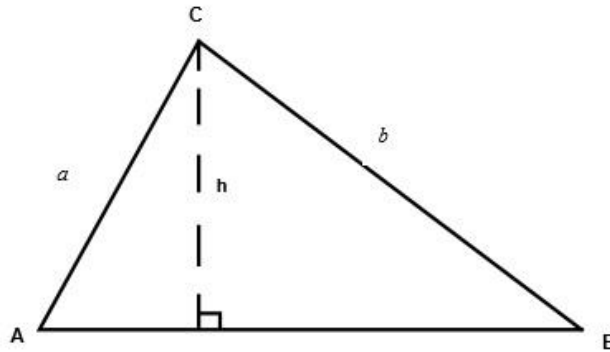
- 5.1 In $\triangle ABC$, $CD \perp AB$, $\hat{A} = x$, $\hat{B} = 41^\circ$, $AD = 14$ units and $BD = 15$ units.



- 5.1.1 Calculate the numerical value of h , correct to TWO decimal places. (3)
- 5.1.2 Determine the numerical value of x , correct to ONE decimal place. (3)

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5.2 In $\triangle ABC$, $BD \perp AC$, $BD = h$ units, $AB = c$ units, $AC = b$ units and $BC = a$ units.



5.2.1 Write down $\sin A$ in terms of h and b . (1)

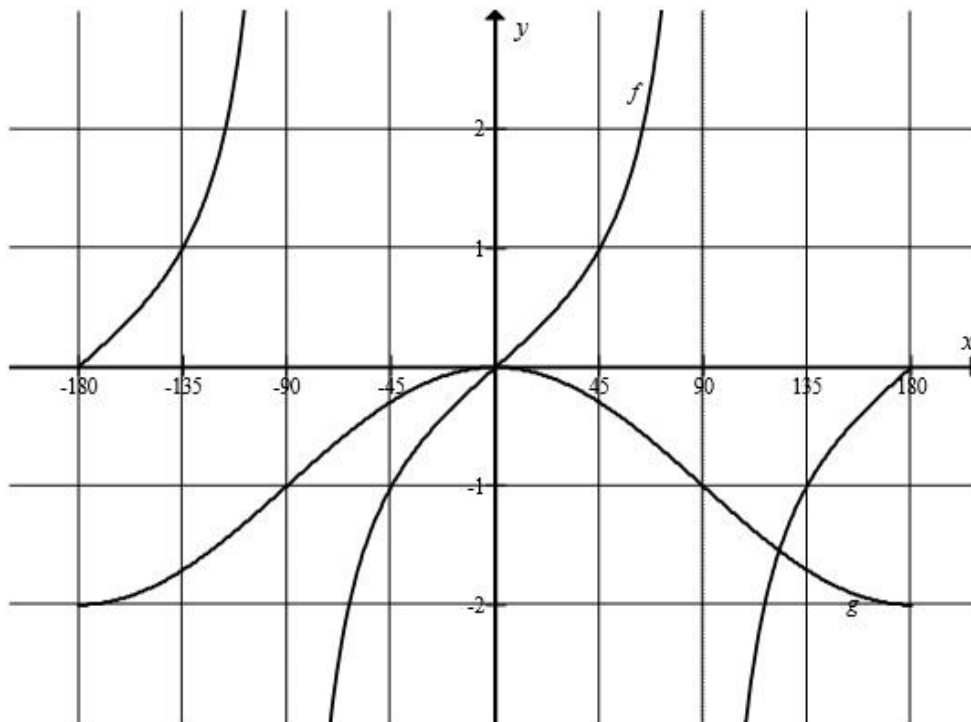
5.2.2 Write down $\sin B$ in terms of h and a . (1)

5.2.3 Hence, show that $\frac{\sin A}{a} = \frac{\sin B}{b}$ (4)

5.2.4 Use the above result to calculate \hat{A} , if $a = 32$ cm, $\hat{B} = 40^\circ$ en $b = 25$ cm. (4)
[16]

QUESTION 9 (NOV 07)

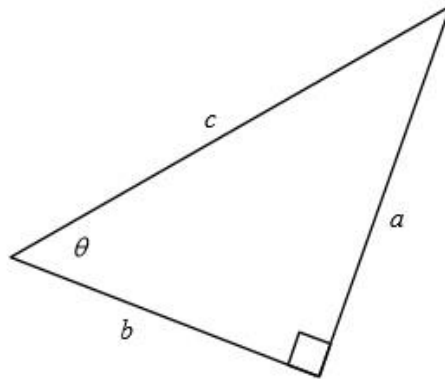
Sketched below are the graphs of $f(x) = a \tan x$ and $g(x) = \cos x + q$.



- 9.1 Write down the period of f . (2)
- 9.2 Determine the value of q . (1)
- 9.3 Write down the value of a . (1)
- 9.4 What is the range of g ? (2)
- 9.5 Determine the x values for which $g(x) \geq f(x)$ for $x \in [-180^\circ; 0^\circ]$ (2)
- [8]**

QUESTION 4 (NON 16)

4.1 A right-angled triangle has sides a , b and c and the angle θ , as shown below.



4.1.1 Write the following in terms of a , b and c :

(a) $\cos \theta$ (1)

(b) $\tan \theta$ (1)

(c) $\sin(90^\circ - \theta)$ (2)

4.1.2 If it is given that $a = 5$ and $\theta = 50^\circ$, calculate the numerical value of b . (2)

4.2 Given that $\hat{A} = 38,2^\circ$ and $\hat{B} = 146,4^\circ$.

Calculate the value of $2\operatorname{cosec}A + \cos 3B$. (3)

4.3 Simplify fully, WITHOUT the use of a calculator:

$$\frac{\sin 45^\circ \cdot \tan^2 60^\circ}{\cos 45^\circ} \quad (4)$$

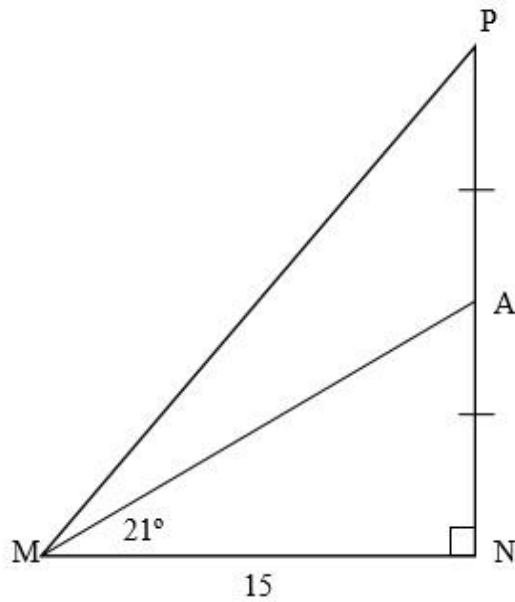
4.4 Given that $5\cos \beta - 3 = 0$ and $0^\circ < \beta < 90^\circ$.

If $\alpha + \beta = 90^\circ$ and $0^\circ < \alpha < 90^\circ$, calculate the value of $\cot \alpha$. (4)

[17]

QUESTION 5

- 5.1 In the sketch below, $\triangle MNP$ is drawn having a right angle at N and $MN = 15$ units. A is the midpoint of PN and $\hat{AMN} = 21^\circ$.

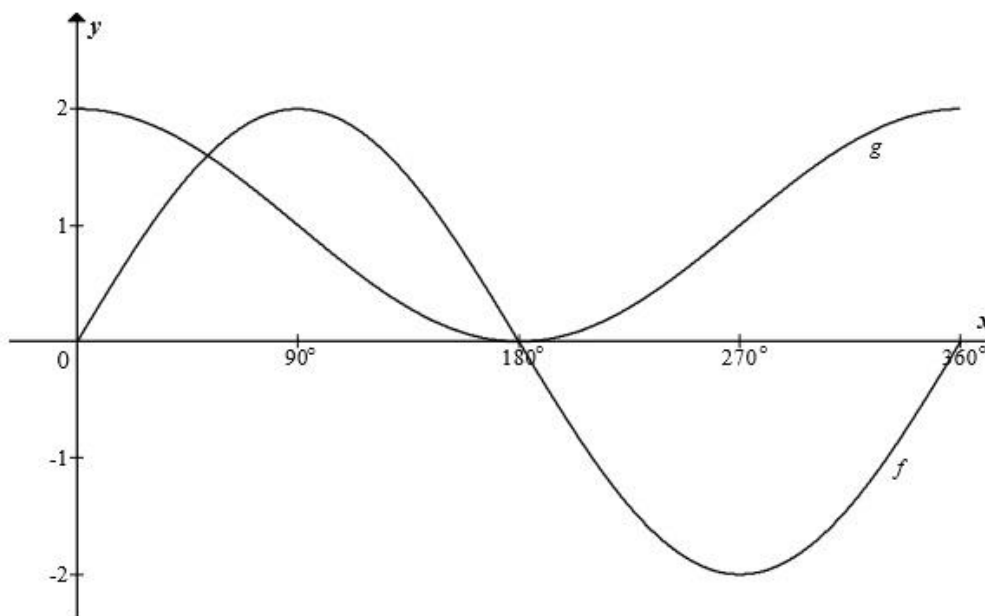


Calculate:

- 5.1.1 AN (3)
- 5.1.2 \hat{PMN} (3)
- 5.1.3 MP (3)
- 5.2 Calculate θ if $2\sin(\theta+15^\circ)=1,462$ and $0^\circ \leq \theta \leq 90^\circ$. (3)
- [12]**

QUESTION 6

The graphs of $f(x) = a \sin x$ and $g(x) = \cos x + 1$ for $x \in [0 ; 360]$ are sketched below.



- 6.1 Write down the value of a . (1)
- 6.2 Write down the period of f . (1)
- 6.3 Write down the range of g . (2)
- 6.4 For which values of x for $x \in [0^\circ ; 360^\circ]$ will $f(x) \cdot g(x) > 0$? (2)
- 6.5 The graph g is reflected about the x -axis and then shifted 2 units upwards to obtain the graph h . Write down the equation of h . (2)

[8]

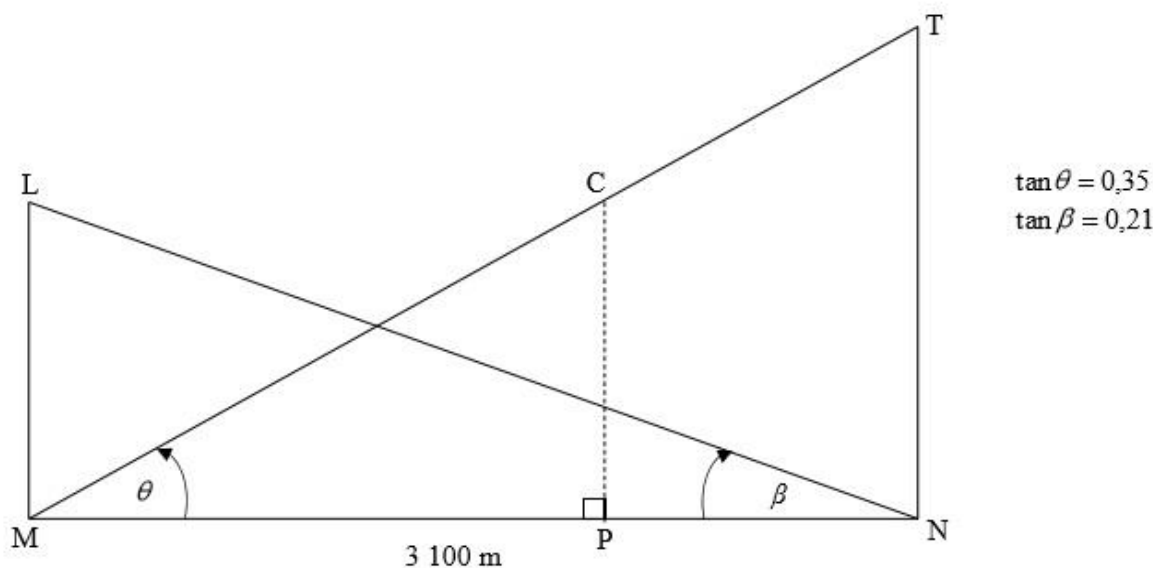
QUESTION 7

The diagram below represents a cross-section of the peaks of Table Mountain, T, and Lions Head, L, above sea level. Points M and N are directly below peaks L and T respectively, such that MPN lies on the same horizontal plain at sea level and P is directly below C.

$MN = 3\,100$ m.

The angle of elevation of L from N is β and the angle of elevation of T from M is θ .

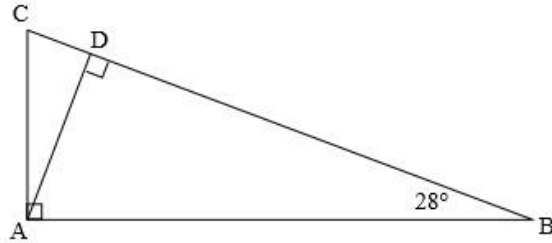
It is given that $\tan\theta = 0,35$ and $\tan\beta = 0,21$.



- 7.1 Calculate the ratio of LM : TN. (4)
- 7.2 A cable car, C, travelling from the top of Table Mountain, T, follows a path along TCM.
- 7.2.1 Calculate the angle formed (\widehat{MTN}) between the cable and the vertical height TN. (2)
- 7.2.2 If the cable car, C, travels along the cable, such that $TC = 400$ m, calculate the height of the cable car above sea level at that instant. (5)
- [11]

QUESTION 4 (NOV 07)

4.1 Consider the following figure

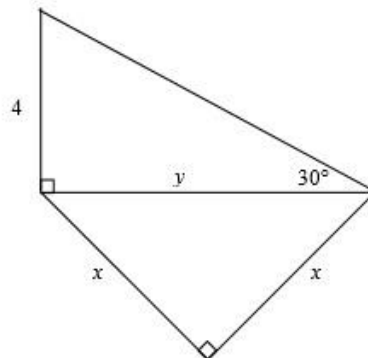


4.1.1 Write down TWO ratios for $\sin 28^\circ$. (2)

4.1.2 If $AB = 5,1$ cm, calculate the value of BD . (3)

4.1.3 Write down a trigonometric definition for $\frac{DC}{AD}$. (2)

4.2 Consider the following diagram.



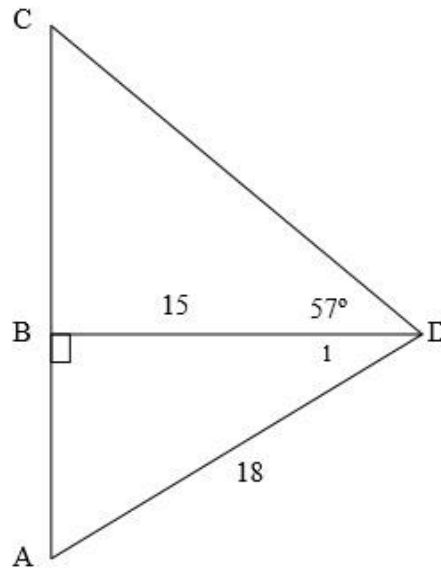
4.2.1 Calculate y . (3)

4.2.2 Calculate x . (3)

[13]

QUESTION 5

In the diagram below the angle of elevation of C from D is 57° . $AD = 18$ cm and $BD = 15$ cm.



- 5.1 Calculate \hat{D}_1 (3)
- 5.2 Calculate the length of AB. (3)
- 5.3 Calculate the length of AC. (4)

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THE END
THANK YOU