3.3 Further Trigonometric Identities and Equations: 30-minute Pack

AQA 8365 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Write down the exact value of tan(60 degrees).

(Total for Question 1 is 1 mark)

---

2 Solving trigonometric equations.

(a) Solve tan(x) = 1.732 for $0 \leq x \leq 360$, giving your answers to 1 decimal place. **(3)**

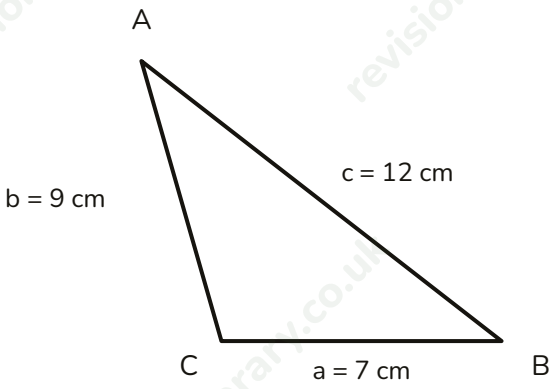
.....

(Total for Question 2 is 3 marks)

© Revision Library | revisionlibrary.co.uk

3 In triangle ABC, a = 7 cm, b = 9 cm and c = 12 cm, where side c is opposite angle C.

Diagram NOT accurately drawn



(a) Calculate the size of angle C, giving your answer correct to 1 decimal place. **(4)**

.....

(Total for Question 3 is 4 marks)

---

4 Given that cos(x) = 4/5 and x is acute, find the exact value of tan(x).

(Total for Question 4 is 2 marks)

---

5 Solving trigonometric equations.

(a) Solve $2\sin^2(x) + \sin(x) - 1 = 0$ for $0 \leq x \leq 360$, giving all solutions. **(5)**

.....

(Total for Question 5 is 5 marks)

© Revision Library | revisionlibrary.co.uk

6 Trigonometric identities.

(a) Show that $(1 - \cos^2(x)) / \sin(x) = \sin(x)$, for $\sin(x)$ not equal to 0. **(2)**

(Total for Question 6 is 2 marks)

---

7 The graph of $y = \cos(x)$ is transformed to give the graph of $y = \cos(2x)$.

(a) Describe fully the single transformation that maps the graph of $y = \cos(x)$ onto the graph of $y = \cos(2x)$. **(2)**

(b) State the period of $y = \cos(2x)$, in degrees. **(1)**

(c) Find all solutions of $\cos(2x) = 0.5$ for $0 \leq x \leq 360$. **(4)**

(Total for Question 7 is 7 marks)

---

8 Simplify $9 \sin^2 x + 9 \cos^2 x$.

(Total for Question 8 is 3 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 3.3 Further Trigonometric Identities and Equations: 30-minute Pack

Question 1

$\sqrt{3}$ oe **B1**

Answer: $\sqrt{3}$

Question 2

(a) arctan(1.732) = 60.0 (principal value, awrt) **M1**

(a) x = 60.0 **A1**

(a) x = 240.0 (ft: principal value + 180, since tan has period 180) **A1**

(a) Answer: x = 60.0 or x = 240.0

Question 3

(a) cosine rule rearranged: $\cos(C) = (a^2 + b^2 - c^2) / (2ab)$ **M1**

(a) correct substitution: $\cos(C) = (49 + 81 - 144) / (2 \times 7 \times 9)$ **M1**

(a) cos(C) = -1/9 oe (-0.111...) **A1**

(a) C = 96.4 degrees awrt **A1**

(a) Answer: 96.4 degrees

Question 4

use $\sin^2(x) + \cos^2(x) = 1$ to find sin(x) = 3/5 (positive root, since x is acute) **M1**

tan(x) = 3/4 oe cao **A1**

Answer: 3/4

Question 5

(a) let s = sin(x) and form $2s^2 + s - 1 = 0$, then factorise (2s - 1)(s + 1) = 0 (or use the quadratic formula) **M1**

(a) s = 0.5 **A1**

(a) s = -1 **A1**

(a) x = 30 and x = 150 (from s = 0.5) **A1**

(a) x = 270 (from s = -1) cao **A1**

(a) Answer: x = 30, 150, 270

Question 6

(a) use $\sin^2(x) + \cos^2(x) = 1$ to write $1 - \cos^2(x) = \sin^2(x)$ **M1**

(a) $\sin^2(x) / \sin(x) = \sin(x)$, fully shown, cso **A1**

(a) Answer: sin(x) (shown)

Question 7

(a) (horizontal) stretch **B1**

(a) scale factor 1/2, parallel to the x-axis oe **B1**

(a) Answer: Horizontal stretch, scale factor 1/2, parallel to the x-axis

(b) 180 degrees, ft from part (a) **B1**

(b) Answer: 180 degrees

(c) let u = 2x and find the principal value: arccos(0.5) = 60 **M1**

(c) use periodicity/symmetry of cos to find all values of u in $0 \leq u \leq 720$: u = 60, 300, 420, 660 **M1**

(c) two of x = 30, 150, 210, 330 correct (x = u/2) **A1**

(c) all four of x = 30, 150, 210, 330 correct cao **A1**

(c) Answer: x = 30, 150, 210, 330

Question 8

uses $\sin^2 x + \cos^2 x = 1$ or $\tan x = \sin x / \cos x$ **M1**

correct algebraic manipulation **M1**

9 oe cao **A1**

Answer: 9

© Revision Library | revisionlibrary.co.uk