4.15 Introduction to Trigonometry: Test Pack

Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A triangular roof has a right-angled cross section. The roof rises 3 m over a horizontal run of 5 m. Find the angle of elevation of the roof to the nearest degree.

(a) Use $\tan(\theta)$ = opposite / adjacent = 3 / 5. **(2)**

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2 A ladder 35 m long leans against a vertical wall and makes an angle of 41° with the horizontal ground. How high up the wall does it reach? Give your answer correct to 1 decimal place.

(3)

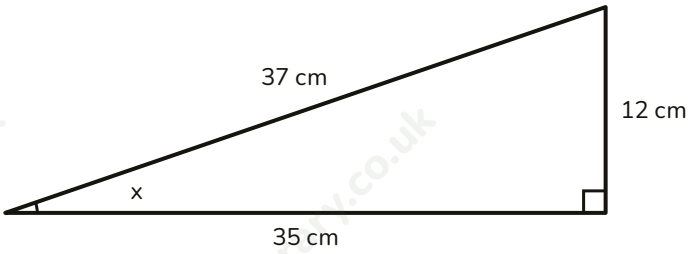
3 A ramp 6 m long makes an angle of 68° with the horizontal. Work out the horizontal distance the ramp covers. Give your answer correct to 1 decimal place.

(3)

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4 In a right-angled triangle the sides are 12 cm, 35 cm and 37 cm. The angle x is opposite the side of length 12.
Write down the value of tan x as a fraction.

Diagram NOT accurately drawn



(1)

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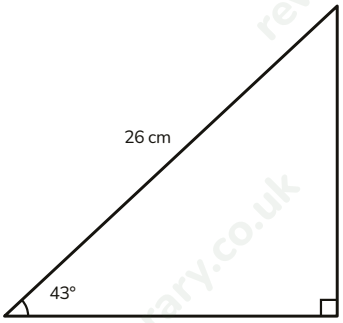
5 Write down the exact value of sin 60°.

(1)

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6 In a right-angled triangle, one angle is 43°. The hypotenuse is 26 cm. Work out the length of the opposite side. Give your answer correct to 1 decimal place.

Diagram NOT accurately drawn



(3)

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7 A ladder leans against a wall making an angle of 75 degrees with the ground. The foot of the ladder is 2.0 m from the wall. Find the length of the ladder to 1 decimal place.

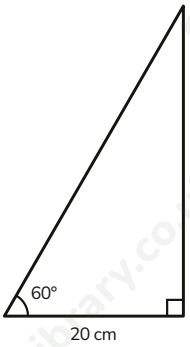
(a) Use cos(75) = adjacent / hypotenuse to find ladder length. **(3)**

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8 In a right-angled triangle, one angle is 60°. The adjacent side is 20 cm. Work out the length of the opposite side. Give your answer correct to 1 decimal place.

Diagram NOT accurately drawn



(3)

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9 Write down the exact value of tan(45 degrees).

(1)

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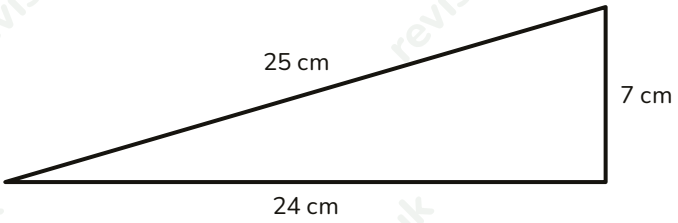
10 In a right-angled triangle you know the lengths of the side opposite angle Z and the side adjacent to angle Z, and you want to find angle Z. Which trigonometric ratio should you use?

(1)

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11 A triangle has sides of length 7 cm, 24 cm and 25 cm.

Diagram NOT accurately drawn



(a) Show that this triangle is right-angled. **(1)**

(b) Given that the right angle is between the sides of length 7 cm and 24 cm, find the size of the angle opposite the 7 cm side, to the nearest degree. **(3)**

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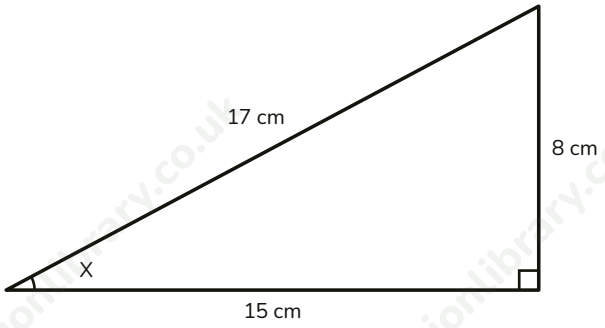
12 A wheelchair ramp rises 4 m over a horizontal distance of 9 m.

(a) Find the angle of elevation of the ramp, to the nearest degree. **(2)**

(b) For this question, use a hypothetical maximum ramp angle of 30 degrees. Does this ramp satisfy the stated limit? **(1)**

13 A right-angled triangle has sides 8 cm (opposite angle X), 15 cm (adjacent to X) and hypotenuse 17 cm.

Diagram NOT accurately drawn



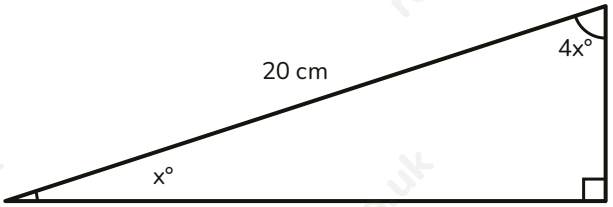
(a) State the trigonometric ratio equal to 8/17 for angle X. **(1)**

(b) Use that ratio to find angle X, to the nearest degree. **(3)**

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14 Stretch question. A right-angled triangle has hypotenuse 20 cm. One acute angle is four times the size of the other.

Diagram NOT accurately drawn



(a) Find the size of each acute angle. **(2)**

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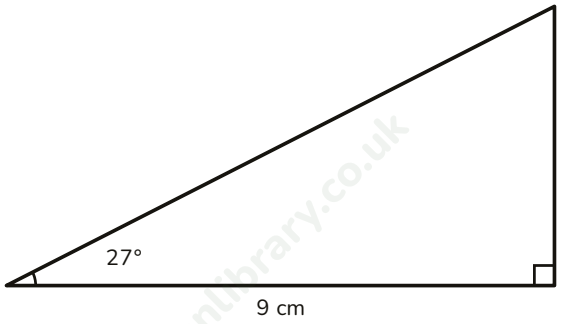
(b) Using the smaller angle, find the length of the side opposite it, to 1 decimal place. **(2)**

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15 Stretch question. A right-angled triangle has one acute angle of 27 degrees and the side adjacent to it measures 9 cm. The opposite side is then increased by 15% while the adjacent side stays the same.

Diagram NOT accurately drawn



(a) Find the length of the original opposite side, to 2 decimal places. **(1)**

.....

(b) Find the new opposite side length after the 15% increase, to 2 decimal places. **(1)**

.....

(c) Calculate the new angle, to the nearest degree. **(2)**

.....

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16 In a right-angled triangle you know an acute angle and the hypotenuse, and you want to find the side adjacent to that angle.

(a) Name the trigonometric ratio you would use. **(1)**

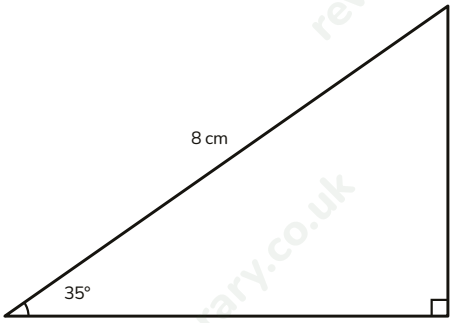
(b) Write the formula for this ratio in words. **(1)**

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17 A right-angled triangle has an acute angle of 35 degrees and hypotenuse 8 cm. Calculate the length of the side opposite this angle, to 1 decimal place.

Diagram NOT accurately drawn

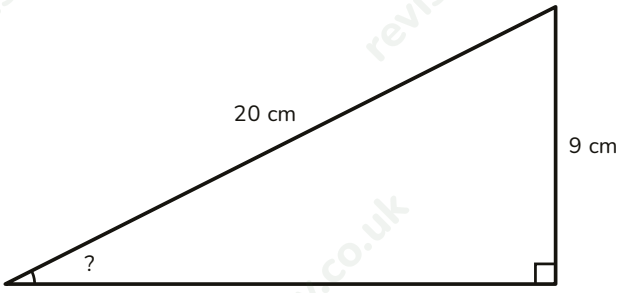


(2)

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18 A right-angled triangle has a side of length 9 cm and hypotenuse 20 cm. Find the size of the acute angle opposite the 9 cm side, to the nearest degree.

Diagram NOT accurately drawn



(2)

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Mark scheme · 4.15 Introduction to Trigonometry: Test Pack

Question 1

(a) method: θ = arctan(3/5) **M1**

(a) 31 degrees to nearest degree cao **A1**

(a) Answer: **31 degrees**

Question 2

sin 41 = h/35 **M1**

35 x sin 41 **M1**

23.0 m cao **A1**

Answer: **23.0 m**

Question 3

cos 68 = x/6 **M1**

6 x cos 68 **M1**

2.2 m cao **A1**

Answer: **2.2 m**

Question 4

12/35 cao **B1**

Answer: **12/35**

Question 5

$\sqrt{3}/2$ cao **B1**

Answer: **$\sqrt{3}/2$**

Question 6

sin 43 = opposite/hypotenuse used correctly **M1**

26 x sin 43 **M1**

17.7 cm cao **A1**

Answer: **17.7 cm**

Question 7

(a) method: hypotenuse = adjacent / cos(75) **M1**

(a) substitution: 2.0 / cos(75) shown **A1**

(a) 7.7 m to 1 dp cao **A1**

(a) Answer: **7.7 m**

Question 8

tan 60 = opposite/adjacent used correctly **M1**

20 x tan 60 **M1**

34.6 cm cao **A1**

Answer: **34.6 cm**

Question 9

1 cao **B1**

Answer: **1**

Question 10

tangent cao **B1**

Answer: **Tangent**

Question 11

(a) calculation $7^2 + 24^2 = 625 = 25^2$ shown **B1**

(a) Answer: **$49 + 576 = 625 = 25^2$**

(b) method: angle = $\sin^{-1}(7/25)$ or equivalent **M1**

(b) correct substitution and evaluation shown **A1**

(b) 16 degrees to nearest degree cao **A1**

(b) Answer: **16 degrees**

Question 12

(a) method: angle = $\tan^{-1}(4/9)$ **M1**

(a) 24 degrees to nearest degree cao **A1**

(a) Answer: **24 degrees**

(b) yes, because 24 degrees is less than 30 degrees, ft from part (a) **B1**

(b) Answer: **Yes, because 24 degrees is less than 30 degrees**

Question 13

(a) sine named since opposite/hypotenuse = 8/17 **B1**

(a) Answer: **Sine**

(b) method: X = $\sin^{-1}(8/17)$ **M1**

(b) correct substitution and evaluation shown **A1**

(b) 28 degrees to nearest degree cao **A1**

(b) Answer: **28 degrees**

Question 14

(a) method: recognise angles sum to 90, so x + 4x = 90, hence x = 18 **M1**

(a) angles are 18 degrees and 72 degrees cao **A1**

(a) Answer: **18 degrees and 72 degrees**

(b) method: opposite = 20 x sin(18) **M1**

(b) 6.2 cm to 1 dp cao **A1**

(b) Answer: **6.2 cm**

Question 15

(a) 4.59 cm cao **B1**

(a) Answer: **4.59 cm**

(b) 5.27 cm cao ft **B1**

(b) Answer: **5.27 cm**

(c) method: new angle = $\tan^{-1}$(new opposite / 9), ft from part (b) **M1**

(c) 30 degrees to nearest degree cao ft **A1**

(c) Answer: **30 degrees**

Question 16

(a) cosine named **B1**

(a) Answer: **Cosine**

(b) cosine = adjacent divided by hypotenuse stated **B1**

(b) Answer: **Cosine = adjacent / hypotenuse**

Question 17

method: opposite = sin(35) x 8 **M1**

4.6 cm to 1 dp cao **A1**

Answer: **4.6 cm**

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Question 18

method: angle = $\sin^{-1}(9/20)$ **M1**

27 degrees to nearest degree cao **A1**

Answer: **27 degrees**

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