

MATHEMATICAL METHODS (CAS)

Unit 2

Targeted Evaluation Task for School-assessed Coursework 1



**2015 Multiple choice and extended response test on circular
functions for Outcome 1**

SOLUTIONS & RESPONSE GUIDE

Total marks for this task = 40

Note: Student marks must be divided by 4 to give the correct marks for the outcomes.

Allocation of marks for Outcomes

Outcome 1 = 10 marks

SECTION A: Multiple-choice questions (1 mark each)

Question 1

Answer: B

Explanation:

$$225 \times \frac{\pi}{180} = \frac{5\pi}{4}$$

Question 2

Answer: B

Explanation:

Sketch on CAS and read the maximum value.

Question 3

Answer: A

Explanation:

$$\text{Period} = \frac{\pi}{1/4} = 4\pi$$

Question 4

Answer: D

Explanation:

$$\tan(2\theta) = -\frac{1}{\sqrt{8}}, \quad \cos(2\theta) = \frac{\sqrt{8}}{3}$$

Question 5

Answer: A

Explanation:

Solve on CAS over the restricted domain.

Question 6

Answer: D

Explanation:

$$\text{Period} = \frac{2\pi}{2/\pi} = \pi^2$$

Question 7

Answer: A

Explanation:

Domain is given in the function form and range is all real numbers.

Question 8

Answer: C

Explanation:

$$\frac{x-3}{2} = \frac{\pi}{2} \Rightarrow x = \pi + 3$$

$$\text{Period} = 2\pi$$

$$\text{Asymptote} = \pi + 3 + 2\pi$$

Question 9

Answer: E

Explanation:

$$\text{Range} = \left[1 - \frac{2}{3}, 1 + \frac{2}{3}\right]$$

Question 10

Answer: A

Explanation:

Solve on CAS.

Question 11

Answer: D

Explanation:

$$\text{Period} = \frac{5\pi}{3}$$

$$x = \frac{5\pi}{6} - \frac{5\pi}{3}$$

Question 12

Answer: B

Explanation:

$$\text{Solve } \sin(\pi a) = \frac{1}{2} \text{ for } a$$

Question 13

Answer: C

Explanation:

Find the value on CAS.

Question 14

Answer: D

Explanation:

$$\text{Period} = \pi$$

Translation of 1 unit down

Question 15

Answer: B

Explanation:

Put $x = 0$

Question 16

Answer: A

Explanation :

Solve on CAS over restricted domain

Question 17

Answer: D

Explanation:

$$\cos(90^\circ + \theta) = -\sin(\theta)$$

$$\sin(\theta) = -0.2851$$

Question 18

Answer: C

Explanation :

$$g(x) = -\sin(-x) + 2.$$

Question 19

Answer: A

Explanation:

Define the two functions on CAS and find the composite function.

Question 20

Answer: E

Explanation:

Note that there is no dilation from the x-axis.

SECTION B- Extended response questions

Question 1

a. $x(0) = 2m$

1 mark

b. $Period = \frac{2\pi}{\pi/24} = 48 \text{ seconds}$

2 marks

c. $x(4) = 2.804m$

2 marks

d. $x(t) = 9, \text{ over } 0 \leq t \leq 192$

$t = 13.28, 34.72, 61.28, 82.72, 109.28, 130.72, 157.28, 178.72$

3 marks

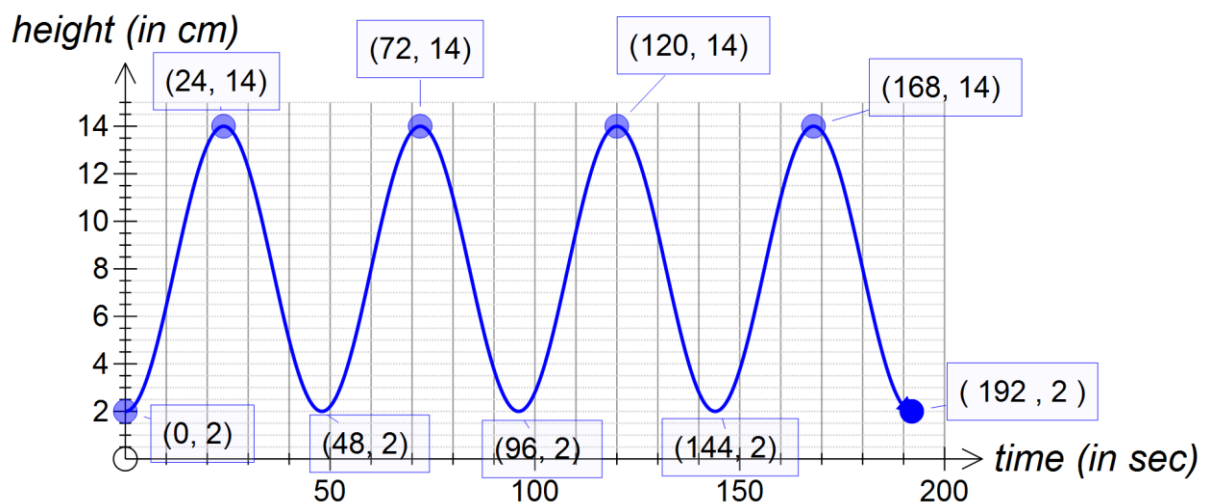
e. $\frac{x(5) - x(0)}{5 - 0} = 0.25 \text{ m/sec}$

2 marks

f. $Max = 14 \text{ m}$

1 mark

g.



4 marks

Question 2

a. $\frac{\pi}{\pi/n} = 12$
 $n = 12$

2 marks

b.

$$v(t) = a \tan\left(\frac{\pi t}{12}\right)$$

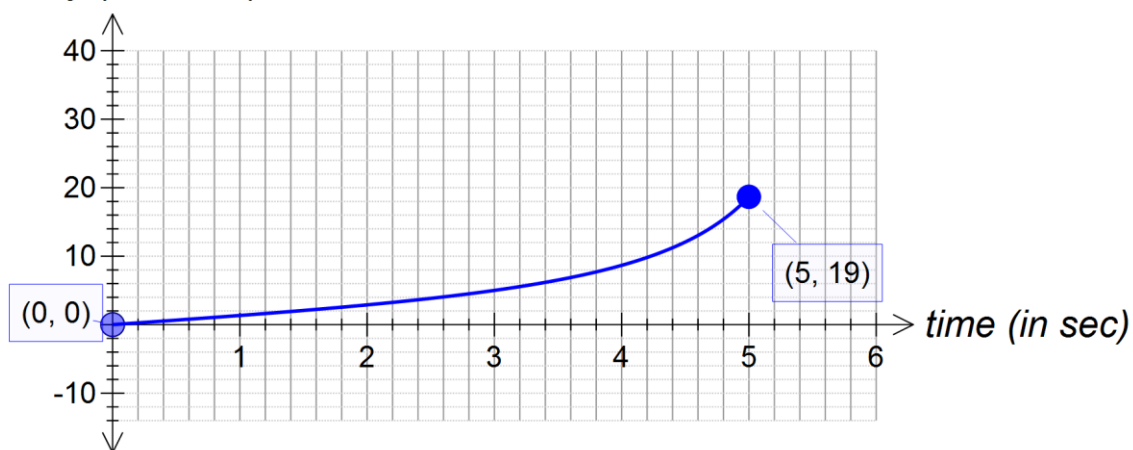
$$5 = a \tan\left(\frac{3\pi}{12}\right)$$

$$a = 5$$

1 mark

c.

velocity (in m/sec)



2 marks