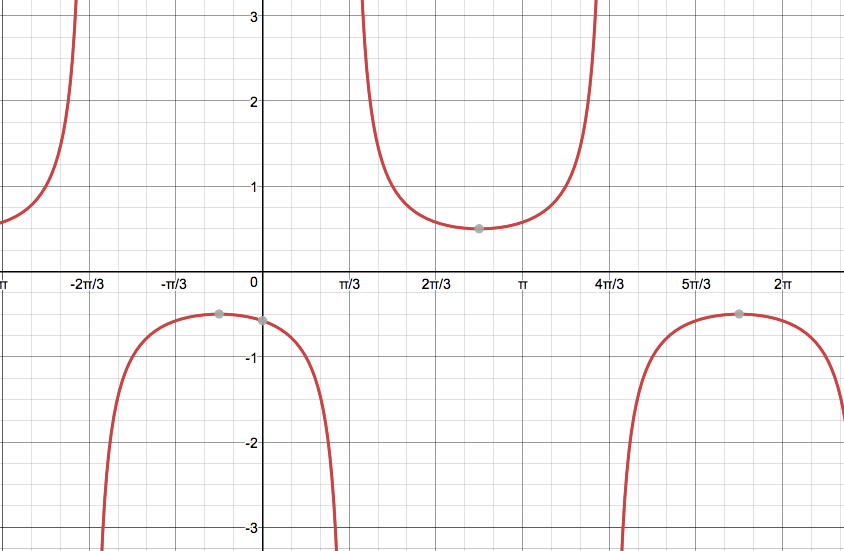
|  |  |
| --- | --- |
| EGC_Black | **MATHEMATICS:SPECIALIST 1 & 2 2017**  **TEST 5**  **Calculator Free** |

**Reading time: 2 minutes Time Allowed: 33 minutes**

**Total Marks: 29**

**1. [4 marks]**

Find the equation of the function graphed below:

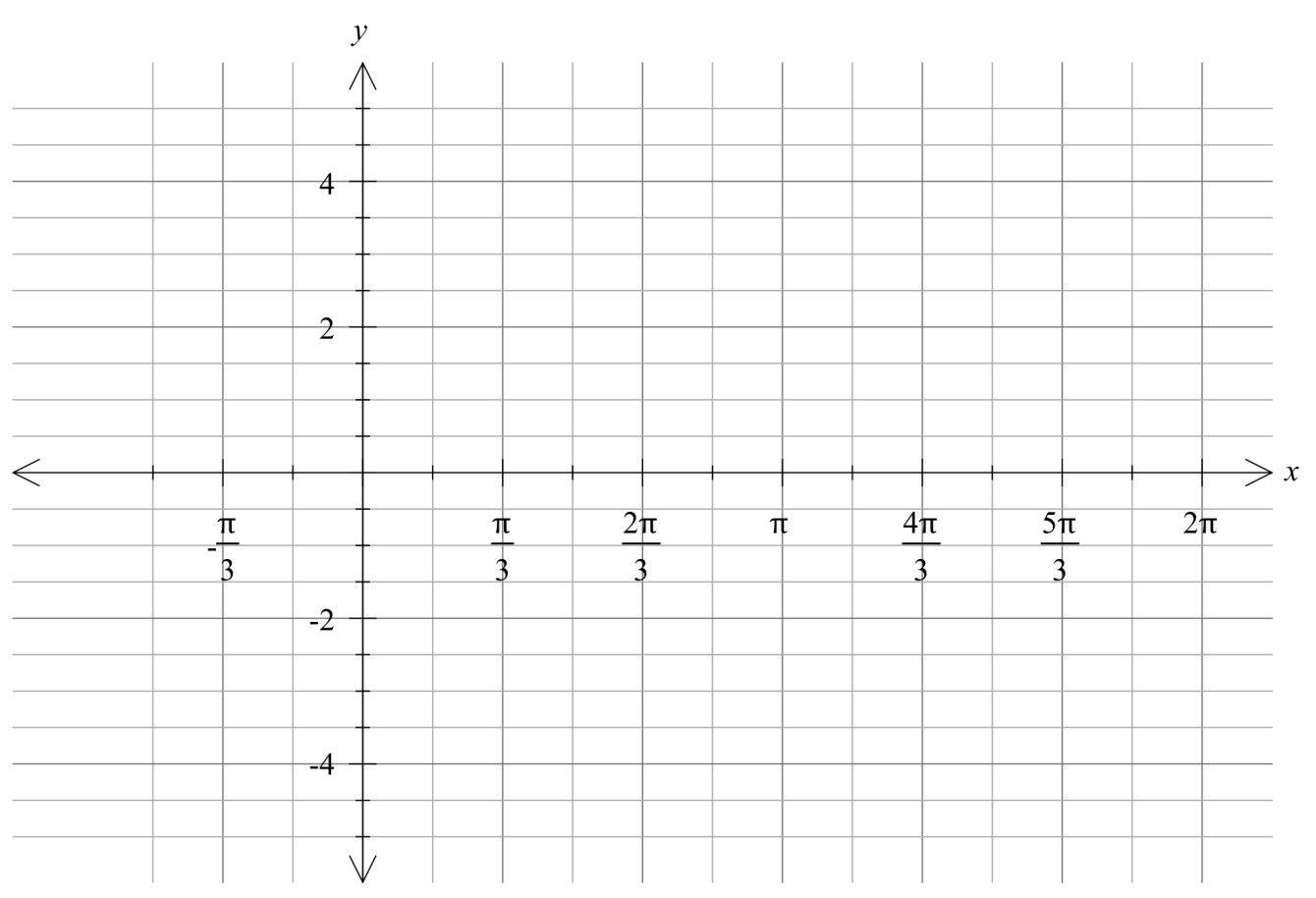


**2. [5 marks]**

Solve the following equation , 0 ≤ x ≤ 2π

**3. [3, 3 = 6 marks]**

(a) Draw a sketch of y = cos 2(x - ) 0 ≤ x ≤ 2π



(b) Hence draw a sketch (on the same set of axis as part ‘a’) of y = 2 sec 2(x - ) 0 ≤ x ≤ 2π

**4. [4 marks]**

Prove the identity .

**5. [2, 4 – 6 marks]**

(a) Show how to express as a rational number. (2 marks)

(b) Prove by contradiction that  is an irrational number. (4 marks)

**6. [2, 2 = 4 marks]**

Find **all** the solutions to the following equations for x in radians

|  |  |
| --- | --- |
| EGC_Black | **MATHEMATICS:SPECIALIST 1 & 2 2017**  **TEST 5**  **Calculator Assumed** |

**Reading time: 2 minutes Time Allowed: 23 minutes**

**Total Marks: 22**

**7. [1, 3, 1 = 5 marks]**

For the sequence **4**, **13**, **22**, **31**, **. . .** ,

(a) Find an expression (in simplest form) for the general term **Tn ,** the nth term, of this sequence.

(b) Prove that the sum of any two consecutive terms of this sequence is always odd.

(c) Use a counter example to disprove that “The sum of any three terms of this sequence is always even.”

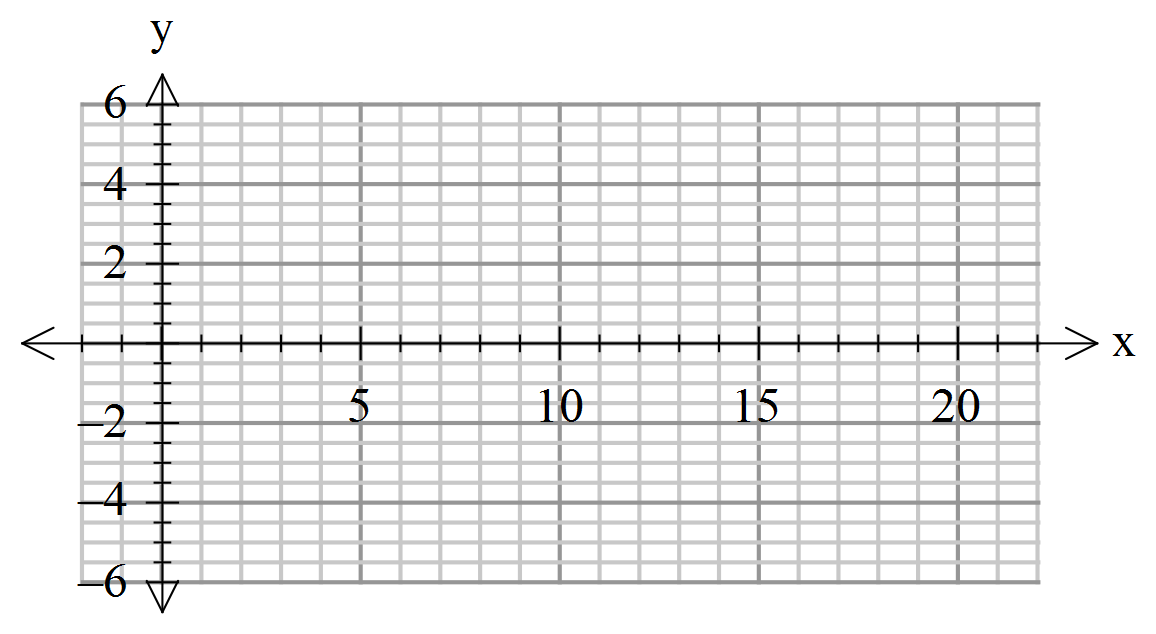
**8. [3, 3, 2, 3 = 11 marks]**

The motion of a small body moving along a straight track was recorded by a video camera for 20 seconds. An analysis of the motion showed the distance, *x* cm, of the body from a fixed point *O* on its path *t* seconds after recording began was given by .

1. The distance can also be given by , where and are real constants.

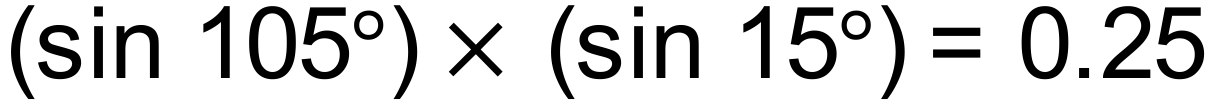
Determine the values of and .

1. Graph on the axes below for



1. State the period and the amplitude of the graph of
2. Determine the percentage of the first 20 seconds that the body was at least four cm away from the point *O.*

**9. [ 3, 3 = 6 marks]**

(a) Use an appropriate product-to-sum identity to show that .

(b) Use an appropriate product-to-sum identity to show that the equation below has two

solutions in the domain . (4 marks)

