STUDIES MOCK P1

1)

Consider the following four numbers.

$$p = 0.00314 \; ; \; q = 0.00314 \times 10^2 \; ; \; r = \frac{\pi}{1000} \; ; \; s = 3.14 \times 10^{-2}$$

(a) One of these numbers is written in the form $a \times 10^k$ where $1 \le a < 10$ and $k \in \mathbb{Z}$. Write down this number.   *[1 mark]*

(b) Write down the smallest of these numbers.   *[2 marks]*

(c) Write down the value of $q + s$.   *[1 mark]*

(d) Give your answer to part (c) in the form $a \times 10^k$ where $1 \le a < 10$ and $k \in \mathbb{Z}$.   *[2 marks]*

Working:

Answers:

(a) _____

(b) _____

(c) _____

(d) _____

2)

(a)   Complete the truth table below.

p	q	$\neg p$	$(p \wedge q)$	$(\neg p \veebar q)$	$(p \wedge q) \Rightarrow (\neg p \veebar q)$
T	T				
T	F				
F	T				
F	F				

[4 marks]

(b)   (i)   State whether the statement $(p \wedge q) \Rightarrow (\neg p \veebar q)$ is a logical contradiction, a tautology or neither.

       (ii)   Give a reason for your answer to part (b)(i).   *[2 marks]*

Working:

Answers:

(b) (i) ....

     (ii) ....

          ....

3)

3

Consider the numbers $\sqrt{3}$, 6, $2\frac{1}{2}$, π, -5, and the sets $\mathbb{N}$, $\mathbb{Z}$, and $\mathbb{Q}$. Complete the following table by placing a tick in the appropriate box if the number is an element of the set.
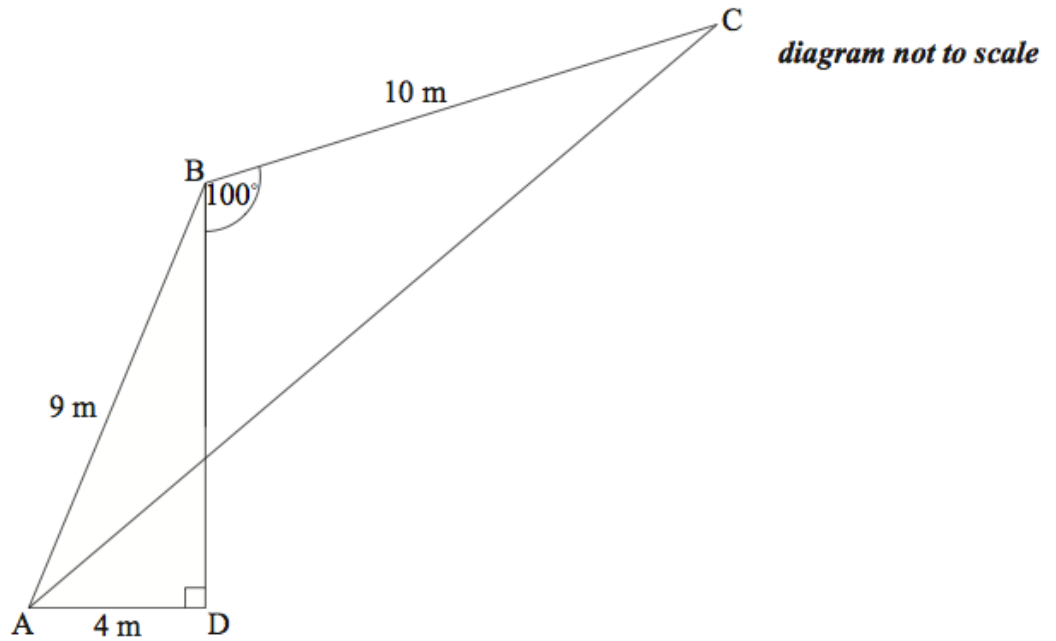
	$\sqrt{3}$	6	$2\frac{1}{2}$	π	-5
$\mathbb{N}$					
$\mathbb{Z}$					
$\mathbb{Q}$					

[6 marks]

Working:

4)

5) Eighty people were asked to identify their favourite filme genre. the results are given in the table

In the diagram, $AD = 4$ m, $AB = 9$ m, $BC = 10$ m, $B\hat{D}A = 90°$ and $D\hat{B}C = 100°$.

diagram not to scale

(a)   Calculate the size of $A\hat{B}C$.   *[3 marks]*

(b)   Calculate the length of AC.   *[3 marks]*

Working:

Answers:

(a)   . . . .

(b)   . . . .

below, classified by gender.

	Adventure	Crime	Romantic	Sci-fi	Totals
Male	15	12	2	12	41
Female	7	9	18	5	39
Totals	22	21	20	17	80

A Chi test, at the 1% significance level, is performed to decide whether film genre is independent of gender.

(a) State the null hypothesis and the alternative hypothesis. *[1 mark]*

(b) Show that the expected frequency of a female's favourite film genre being crime is 10.2.

[2 mark]

(c) Write down the number of degrees of freedom. *[2 mark]*

(d) Write down the chi squared value for this data. *[2 mark]*

given that the critical value is 11.35.

(e) Using the critical value or the p value, comment on your result. *[2 mark]*
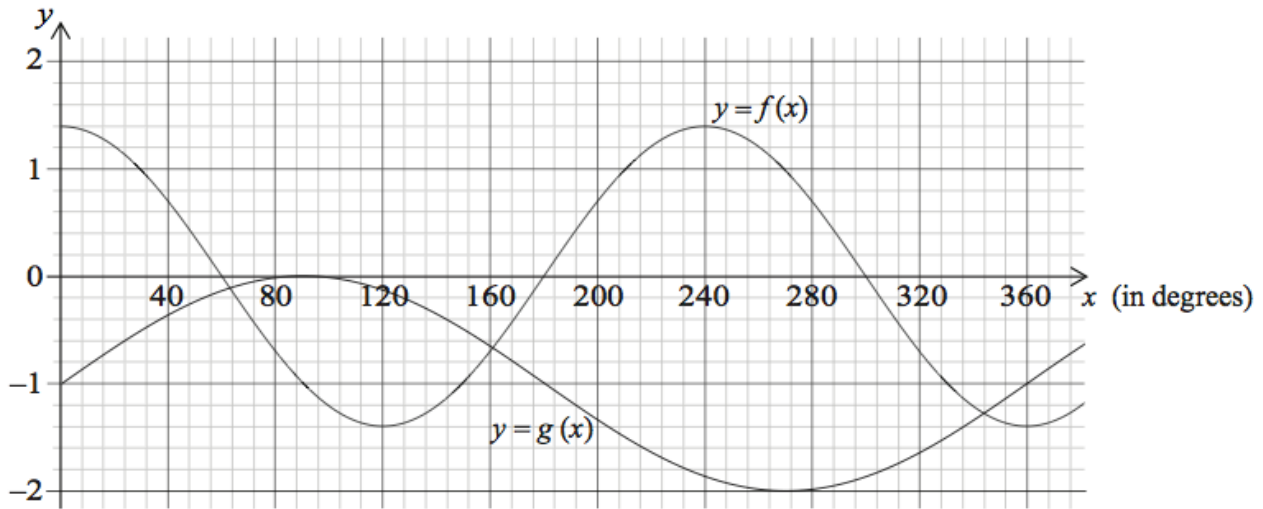
6)

Working:

Answers:

(a) ....

(b) ....

(c) ....

(d) ....

....

7)

The diagram below shows the graph of the functions:

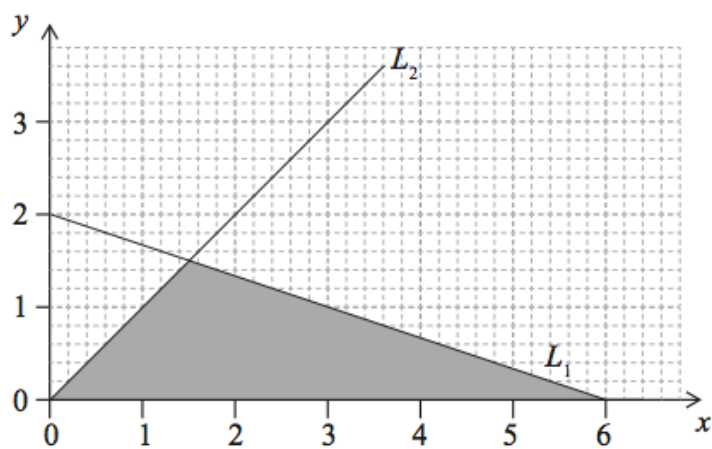$$f(x) = p\cos(qx), \text{ where } p, q \in \mathbb{Q} \text{ and } g(x) = \sin(x) - 1 .$$

(a) Write down the period of $f(x)$. [1 mark]

(b) Write down the value of p. [1 mark]

(c) Calculate the value of q. [2 marks]

(d) Use your graphic display calculator to find any solutions to the equation $f(x) = g(x)$ in the interval $180° \leq x \leq 360°$. [2 marks]

Working:

Answers:

(a) _____

(b) _____

(c) _____

(d) _____

The diagram shows the straight lines L_1 and L_2. The equation of L_2 is $y = x$.

(a) Find

    (i)   the gradient of L_1;

    (ii) the equation of L_1.   *[3 marks]*

(b) Find the area of the shaded triangle.   *[3 marks]*

Working:

Answers:

(a) (i) ....

      (ii) ....

(b) ....

8)

A room is in the shape of a cuboid. Its floor measures 7.2 m by 9.6 m and its height is 3.5 m.

diagram not to scale

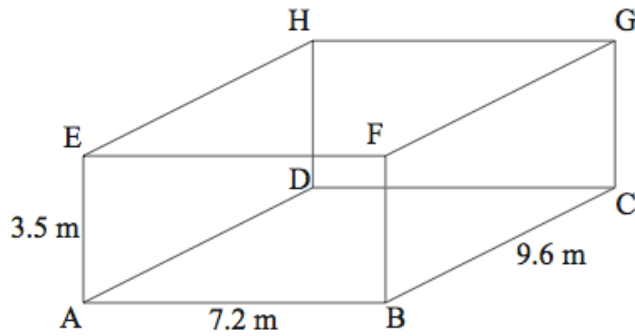(a)   Calculate the length of AC.   *[2 marks]*

(b)   Calculate the length of AG.   *[2 marks]*

(c)   Calculate the angle that AG makes with the floor.   *[2 marks]*

Working:

Answers:

(a)   ....

(b)   ....

(c)   ....

9)

Manisha borrows 200 000 Indian rupees (INR) from a money lender for 18 months at an annual rate of 15 % **simple** interest.

(a) Calculate the **interest** that Manisha must pay at the end of the 18 months. *[2 marks]*

Kunal borrows 200 000 INR from the money lender for 18 months at a nominal annual interest rate of 15 %, **compounded monthly**.

(b) Calculate the **total amount** that Kunal must repay at the end of the 18 months. Give your answer to the nearest rupee. *[4 marks]*

Working:

Answers:

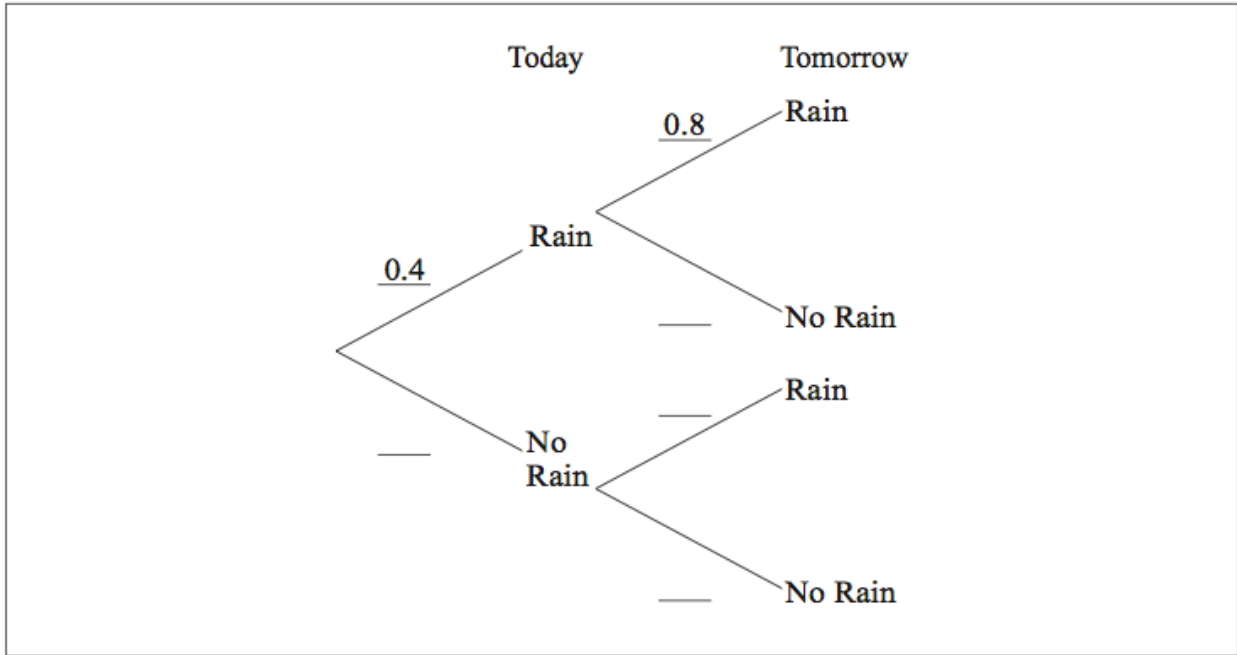(a) ....

(b) ....

10)

The probability that it rains today is 0.4. If it rains today, the probability that it will rain tomorrow is 0.8. If it does not rain today, the probability that it will rain tomorrow is 0.7.

(a)   Complete the tree diagram below.   *[3 marks]*

Today   Tomorrow

0.8   Rain

Rain

0.4

——   No Rain

Rain

——

No   ——

Rain

No Rain

(b)   Calculate the probability of rain tomorrow.   *[3 marks]*

Working:

Answers:

(b)   . . . .

11)

$$f(x) = \frac{1}{3}x^3 + 2x^2 - 12x + 3.$$

(a)   Find $f'(x)$.   [3 marks]

Working:	
	Answers:
	(a) ....

12)

In this question give all answers correct to 2 decimal places.

George travelled from the USA to Europe and changed 1200 dollars (USD) into Euros (EUR). The exchange rate was 1 USD = 0.8154 EUR.

(a) Calculate the number of EUR George received.   *[2 marks]*

On his return, George had 160 EUR to change back into USD.
There was 4.5 % commission charged on the exchange.
The exchange rate was 1 USD = 0.8202 EUR.

(b) Calculate the value, in **EUR**, of the commission that George paid.   *[2 marks]*

(c) Calculate the number of dollars George received.   *[2 marks]*

Working:

Answers:

(a) . . . .

(b) . . . .

(c) . . . .

13)

The number of cells, C, in a culture is given by the equation $C = p \times 2^{0.5t} + q$, where t is the time in hours measured from 12:00 on Monday and p and q are constants.

The number of cells in the culture at 12:00 on Monday is 47.
The number of cells in the culture at 16:00 on Monday is 53.

Use the above information to

(a) write down two equations in p and q ;   [2 marks]

(b) calculate the value of p and of q ;   [2 marks]

(c) find the number of cells in the culture at 22:00 on Monday. [2 marks]

Working:

Answers:

(a) _____

_____

(b) _____

(c) _____

14)

The mean of the ten numbers listed below is 6.8.

$$8, 5, 5, 10, 8, 4, 9, 7, p, q$$

(a)   Write down an equation in terms of p and q.　　　　　　　　　*[2 marks]*

The mode of these ten numbers is five and p is less than q.

(b)   Write down the value of

    (i) p;

    (ii) q.　　　　　　　　　*[2 marks]*

(c)   Find the median of the ten numbers.　　　　　　　　　*[2 marks]*

Working:

Answers:

(a) _____

(b) (i) _____

     (ii) _____

(c) _____