IB Maths Studies mini Topic Exam: Mixed Topics

Recommended Time: 30mins.  
Total Mark: /24

Student Name: ____________________  
Teacher: ____________________

Question 1

[Maximum mark: 6]  
The radius of a sphere made from steel is 40 mm.

(a)  
Calculate the volume, in mm³, of the steel sphere.   [2]

The steel sphere is heated, and as a result the volume of the steel sphere increases by 0.1%.

(b)  
Calculate the radius of the steel sphere following this increase, correct to two decimal places.   [4]

Working

/6
Question 2

[Maximum mark: 6]

The third term, $u_3$, of an arithmetic sequence is 7. The common difference of the sequence, $d$, is 3.

(a) Find $u_1$, the first term of the sequence. [2]

(b) Find $u_{60}$, the 60th term of the sequence. [2]

(c) The first and fourth terms of this arithmetic sequence are the first two terms of a geometric sequence. Calculate the sixth term of the geometric sequence. [2]

Working

/6
Question 3

[Maximum mark: 6]

Consider the function \( f(x) = 2x^2 - bx + c \).

(a) Find \( f'(x) \). [1]

The equation of the tangent line to the graph of \( y = f(x) \) at \( x = -1 \) is \( y = 2x - 7 \).

(b) Calculate the value of \( b \). [3]

(c) Calculate the value of \( c \). [2]

Working

/6
Question 4

[Maximum mark: 6]  

The amount of sugar in 100 grams of grapes, $S$, follows a normal distribution with a mean of 16 grams and standard deviation 1 gram.

(a) Find the probability that 100 grams of grapes chosen at random contains between 15.5 grams and 16.2 grams of sugar.  \[2\]

(b) 90% of randomly chosen 100 gram portions of grapes contain less than $k$ grams of sugar. Calculate the value of $k$. \[2\]

(c) For 100 grams of grapes chosen at random, $P(a < S < b) = 0.98$. If $16 - a$ is equal to $b - 16$, calculate the values of $a$ and $b$. \[2\]