Question 1

QUESTION 8

Simple Familiar
Technology Free
2020

An equation of the line passing through the points A(2, 4, 5) and B(3, –2, 1) is

(A) $2\hat{i}+4\hat{j}+5\hat{k}+t(3\hat{i}-2\hat{j}+\hat{k}), t \in R$

(B) $-3\hat{i}+2\hat{j}-\hat{k}+t(\hat{i}-6\hat{j}-4\hat{k}), t \in R$

(C) $\frac{x-1}{2}=\frac{y+6}{4}=\frac{z+4}{5}$

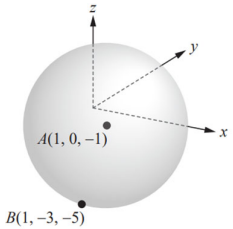
(D) $\frac{x-3}{-1}=\frac{y+2}{6}=\frac{z-1}{4}$

Question 2

QUESTION 8

Simple Familiar
Technology Free
2023

Point A is the centre of a sphere and point B lies on its surface as shown.



The equation of the sphere is

(A) $x^2-2x+y^2+z^2+2z=23$

(B) $x^2+2x+y^2+z^2-2z=23$

(C) $x^2-2x+y^2+z^2+2z=25$

(D) $x^2+2x+y^2+z^2-2z=25$

Question 3

QUESTION 5

Simple Familiar
Technology Free
2020

Determine $\int 4x(3x^2+5)^3\,dx$

(A) $\frac{1}{6}(3x^2+5)^4+c$

(B) $\frac{2}{3}(3x^2+5)^4+c$

(C) $2(3x^2+5)^2+c$

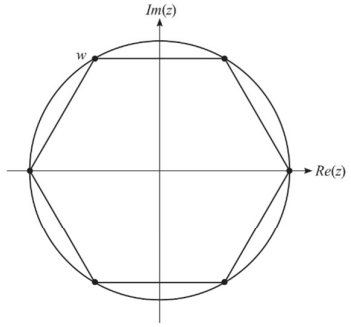
(D) $72x^2(3x^2+5)^2+c$

Question 4

QUESTION 11 (7 marks)

Simple Familiar
Technology Free
2020

The vertices of a regular hexagon are positioned on the circumference of a unit circle as shown on the Argand plane.



Consider the complex number w, as shown on the plane.

a) Determine w, expressing your answer in the form $r\,\text{cis}(\theta)$. *[1 mark]*

b) Convert w into Cartesian form. *[2 marks]*

Each vertex of the hexagon is a solution of an equation of the form $z^n = a$ where $z \in C$.

c) State the value of n. *[1 mark]*

d) State the value of a. *[1 mark]*

e) Verify that w satisfies the equation $z^n = a$ using the results from 11c) and 11d). *[2 marks]*

Question 5

QUESTION 13 (6 marks)

Simple Familiar
Technology Free
2021

Use $z = a + bi$ and $w = c + di$, where $a, b, c, d \in R$, to prove

$$|z-w|^2 = |z|^2 + |w|^2 - 2Re(z\bar{w})$$