TMUA Homework 2

10 Questions

40 Minutes

请计时并不要使用计算器，完成后请填写线上表格提交作业

Question 1

It is given that the expansion of $(ax + b)^3$ is $8x^3 - px^2 + 18x - 3\sqrt{3}$, where a, b and p are real constants.

What is the value of p?

A $-12\sqrt{3}$

B $-6\sqrt{3}$

C $-4\sqrt{3}$

D $-\sqrt{3}$

E $\sqrt{3}$

F $4\sqrt{3}$

G $6\sqrt{3}$

H $12\sqrt{3}$

Question 2

The coefficient of x^3 in the expansion of $(1 + 2x + 3x^2)^6$ is equal to twice the coefficient of x^4 in the expansion of $(1 - ax^2)^5$.

Find all possible values of the constant a.

A $\pm 2\sqrt{2}$

B $\pm \sqrt{17}$

C $\pm \sqrt{34}$

D $\pm 2\sqrt{17}$

E There are no possible values of a.

Question 3

What is the total area enclosed between the curve $y = x^2 - 1$, the x-axis and the lines $x = -2$ and $x = 2$?

A $\frac{4}{3}$

B $\frac{8}{3}$

C 4

D $\frac{16}{3}$

E 12

F 16

Question 4

The least possible value of the gradient of the curve $y = (2x + a)(x - 2a)^2$ at the point where $x = 1$, as a varies, is

A $-\frac{49}{4}$

B -8

C $-\frac{25}{4}$

D $\frac{7}{4}$

E $\frac{47}{16}$

Question 5

The function $\frac{1-x}{\sqrt[3]{x^2}}$ is defined for all $x \neq 0$.

The complete set of values of x for which the function is decreasing is

A $x \leq -2, \ x > 0$

B $-2 \leq x < 0$

C $x \leq 1, \ x \neq 0$

D $x \geq 1$

E $-2 \leq x \leq 1, \ x \neq 0$

F $x \leq -2, \ x \geq 1$

Question 6

The perpendicular bisector of the line segment joining the points $(2, -6)$ and $(5, 4)$ cuts the x-axis at the point with x-coordinate

A $\frac{1}{20}$

B $\frac{1}{6}$

C $\frac{1}{3}$

D $\frac{19}{5}$

E $\frac{41}{6}$

Question 7

The curve $y = \cos x$ is reflected in the line $y = 1$ and the resulting curve is then translated by $\frac{\pi}{4}$ units in the positive x-direction. The equation of this new curve is

A $y = 2 + \cos\left(x + \frac{\pi}{4}\right)$

B $y = 2 + \cos\left(x - \frac{\pi}{4}\right)$

C $y = 2 - \cos\left(x + \frac{\pi}{4}\right)$

D $y = 2 - \cos\left(x - \frac{\pi}{4}\right)$

Question 8

The cross-section of a triangular prism is an equilateral triangle with side $2x$ cm.
The length of the prism is d cm.

Let the total surface area of the prism be T cm^2. Given that the volume of the prism is T cm^3, which one of the following is an expression for d in terms of x?

A $\dfrac{x}{2x-3}$

B $\dfrac{3x}{3x-2\sqrt{3}}$

C $\dfrac{2x}{x-4\sqrt{3}}$

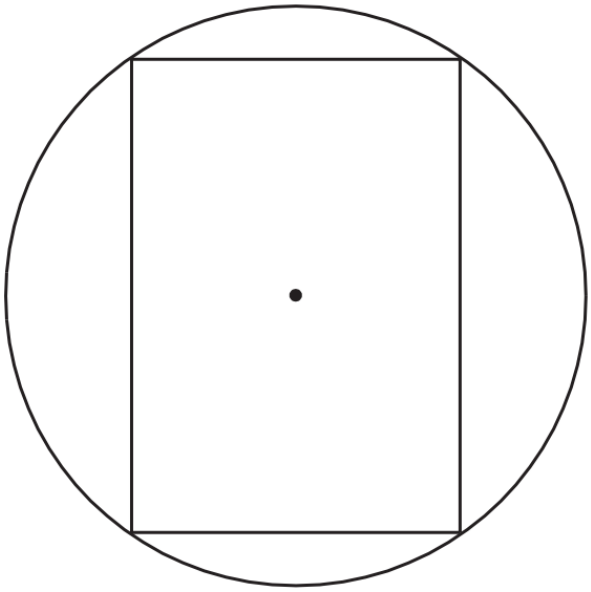
D $\dfrac{2x}{x-2\sqrt{3}}$

E $\dfrac{2x}{x-\sqrt{3}}$

Question 9

A right circular cylinder is contained within a sphere of radius 5 cm in such a way that the whole of the circumferences of both ends of the cylinder are in contact with the sphere.

The diagram shows a planar cross section through the centre of the sphere and cylinder.



[diagram not to scale]

Find, in cubic centimetres, the maximum possible volume of the cylinder.

A 250π

B 500π

C 1000π

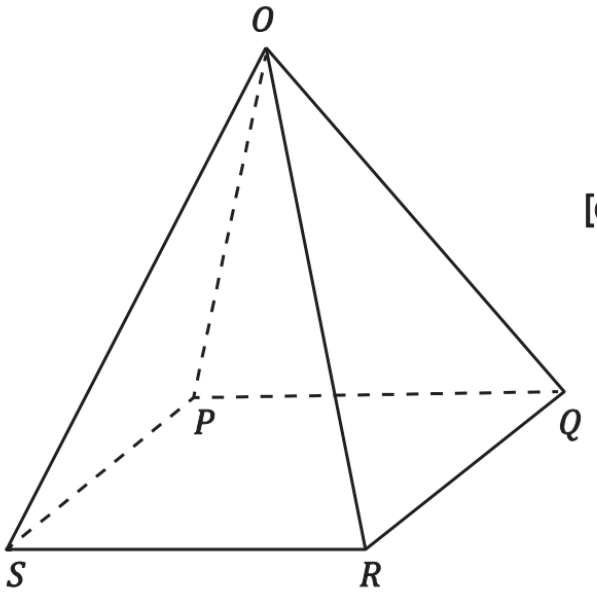
D $\frac{250\sqrt{3}}{3}\pi$

E $\frac{500\sqrt{3}}{9}\pi$

F $\frac{1000\sqrt{3}}{9}\pi$

Question 10

The diagram shows a square-based pyramid with base $PQRS$ and vertex O. All the edges of the pyramid are of length 20 metres.



[diagram not to scale]

Find the shortest distance, in metres, along the outer surface of the pyramid from P to the midpoint of OR.

A $10\sqrt{5-2\sqrt{3}}$

B $10\sqrt{3}$

C $10\sqrt{5}$

D $10\sqrt{7}$

E $10\sqrt{5+2\sqrt{3}}$