

PART A: MULTIPLE CHOICE (non-calculator)

SECTION I

Value: 11 marks

Allowable Time: 25 minutes

INSTRUCTIONS: No calculator may be used for this section of the examination. For each question, select the **best** answer and record your choice on the blue Response Form provided. Using an HB pencil, completely fill in the circle on the blue Response Form that has the letter corresponding to your answer.

1. Give the period of $f(x) = 3\cot x$.

A. $\frac{\pi}{3}$

B. π

C. 2π

D. 3π

2. Determine the minimum value of the function $y = -5\cos 2x + 3$.

A. -9

B. -8

C. -2

D. 2

3. Determine the exact value of $\csc \frac{5\pi}{3}$.

A. $-\frac{\sqrt{3}}{2}$

B. $-\frac{2}{\sqrt{3}}$

C. $\frac{2}{\sqrt{3}}$

D. $\frac{\sqrt{3}}{2}$

4. The terminal arm of angle θ , in standard position, passes through the point $(2, -9)$. Determine the value of $\cos \theta$.

A. $\frac{-2}{\sqrt{85}}$

B. $-\frac{9}{\sqrt{85}}$

C. $\frac{2}{\sqrt{85}}$

D. $\frac{9}{\sqrt{85}}$

5. Simplify: $6\cos^2 8x - 3$

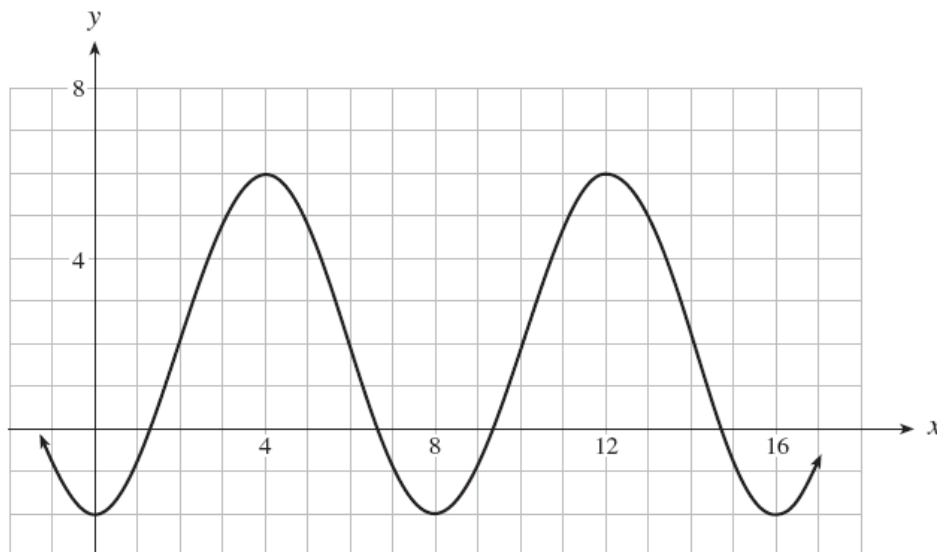
A. $6\cos 2x$

B. $3\cos 4x$

C. $2\cos 24x$

D. $3\cos 16x$

6. Determine an expression equivalent to: $\cos(\pi - 2A)$.
- A. $-\cos 2A$ B. $\cos 2A$ C. $-\sin 2A$ D. $\sin 2A$
7. If the graph of the function shown below has the equation $y = a \sin b(x - c) + d$, with $a < 0$ and $b > 0$. Determine the smallest positive value of c .



- A. 2 B. 4 C. 6 D. 8

This is the end of Part A, Section I.

You may proceed to the rest of the examination *without* the use of a calculator until directed by the supervisor to access your calculator. At the end of 25 minutes, you will not be able to go back to Part A, Section I; therefore, ensure you have checked this section.

PART A: MULTIPLE CHOICE SECTION II

Value: 15 marks

Suggested Time: 30 minutes

8. If the graph $x^2 = y + 8$ is horizontally compressed by a factor of $\frac{1}{3}$, then reflected in the x -axis, determine an equation for the new graph.
- A. $\frac{x^2}{9} = -y + 8$ B. $\frac{x^2}{9} = -y - 8$ C. $9x^2 = -y + 8$ D. $9x^2 = -y - 8$

9. The point $(9, -12)$ is on the graph of a function. What will the coordinates of this point be after all of the following transformations are performed on the function, in the order given?

- horizontal expansion by a factor of 3
- reflection in the x -axis
- reflection in the line $y = x$
- vertical translation of 5 downward

A. $(-12, -32)$ B. $(-12, 22)$ C. $(12, 22)$ D. $(12, -32)$

10. If the point $(8, 12)$ is on the graph of $y = f(x)$, what point must be on the graph of $y = 4\left(\frac{1}{f(x)}\right)$?

A. $(12, 32)$ B. $\left(8, \frac{1}{3}\right)$ C. $\left(8, \frac{1}{48}\right)$ D. $(12, 2)$

11. Solve: $3\cot x = -7$, $0 \leq x < 2\pi$

A. 0.40, 5.88 B. 0.40, 3.55 C. 2.74, 5.88 D. 2.74, 3.55

12. In a seaport the function $d(t) = 2.7\sin 0.25(t-5) + 3.3$ can be used to approximate the depth of the water, d metres, at time t hours after midnight. Estimate the number of hours in the 24-hour interval starting at $t = 0$ when the depth of the water is at least 3.6 m.

A. 17.12 B. 16.93 C. 11.68 D. 5.44

13. Evaluate: $\log_8 1000$

A. 2.10 B. 2.37 C. 3.32 D. 3.90

14. Solve for x : $A^{x+2} = B^x$

A. $\frac{2\log A}{\log B - \log A}$ B. $3\log A - \log B$ C. $\frac{\log A - \log B}{2\log A}$ D. $\frac{2\log A}{\log A - \log B}$

15. Determine the number of different arrangements of all the letters in the word BAZAAR

A. 36 B. 60 C. 120 D. 720

16. In the expansion of $(3x - 2y)^9$, what is the coefficient of the term containing x^4y^5 ?

A. $-326\,592$ B. $-10\,206$ C. $10\,206$ D. $326\,592$

This is the end of the multiple-choice section.
Answer the remaining questions directly in this examination booklet.

PART B: WRITTEN RESPONSE (3 marks each)

1. If 200 g of a substance decays to 17 g in 28 days, determine the half-life of this substance. Solve algebraically using logarithms. Answer accurate to at least 2 decimal places.

Prove the identity:

$$\frac{\sin x}{1 - \sin x} - \frac{\sin x}{1 + \sin x} = 2 \tan^2 x$$

LEFT SIDE

RIGHT SIDE