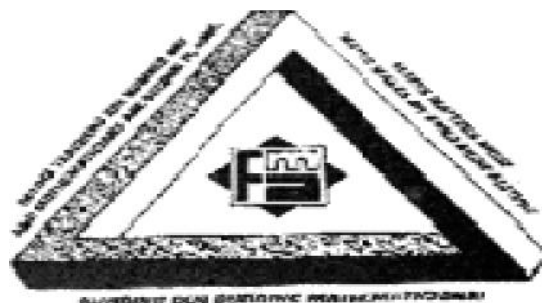


FIJI MATHEMATICS ASSOCIATION



FIJI MATHEMATICS COMPETITION

(FMC)

FORM 7

Thursday 11th July 2013

Time Allowed: 1 Hour 15 minutes

Note:

Calculators are NOT permitted.

Diagrams are NOT drawn to scale.

Instructions:

1. Print your **Name, School Name** and **Form** clearly in the space provided on the answer sheet.
2. Shade the circle corresponding to your answer with pencil on the answer sheet provided.
3. Multiple answers **will not be** accepted.

1. $\left[\frac{4b^4}{d^2} \right]^3$ equals to:
 A. $\frac{4b^3}{d^2}$ B. $\frac{12b^{12}}{d^6}$ C. $\frac{64b^{12}}{d^6}$ D. $\frac{64b^7}{d^5}$ E. $\frac{7b^7}{d^5}$
2. $6 \times e^3 \times b^2 \times b^4 \times e$ equals to:
 A. $6e^4b^6$ B. $6e^3b^6$ C. $6eb^9$ D. $6eb^{10}$ E. $6e^3b^8$
3. The value of k for which $(x - 3)$ is a factor of $x^3 - 2x^2 - 5x + k$ is:
 A. -17 B. -5 C. 5 D. 6 E. 17
4. The remainder on dividing $p(x) = x^3 - 3x^2 + \frac{3}{2}x + 5$ by $x - 2$ is:
 A. 0 B. 1 C. 4 D. 3 E. -2
5. $5^{-x} \times 5^x$ is equal to:
 A. 1 B. $\frac{1 + 5^{2x}}{5^x}$ C. 5^{-x^2} D. 6 E. $\frac{1 + 5^x}{5^x}$
6. Which of the following expressions gives $(4 + 16 + 64 + 256)$
 A. $\sum_{x=1}^4 4x$ B. $\sum_{x=0}^4 x^4$ C. $\sum_{x=0}^4 4^x$ D. $\sum_{x=0}^4 4x$ E. $\sum_{x=1}^4 4^x$
7. The equivalent of $\frac{x+3}{2} - \frac{x+2}{6}$ is:
 A. $\frac{x+4}{6}$ B. $\frac{2x+7}{6}$ C. $\frac{3x-4}{6}$ D. $\frac{5}{3}$ E. $\frac{3x+8}{6}$
8. The common ratio of the geometric sequence $-1, x, -x^2, x^3, -x^4 \dots$ is:
 A. 1 B. x C. -1 D. -x E. $1 - x$
9. The quadratic equation $x^2 + 2x - 8 = 0$ has solution at:
 A. $x = 4$ and $x = -2$ B. $x = -4$ and $x = 2$ C. $x = -4$ and $x = 4$
 D. $x = -2$ and $x = 2$ E. no solution which are integers
10. A circle centered at the origin, passes through the point $(3, \sqrt{7})$.
 The equation of the circle is
 A. $x^2 + y^2 = \sqrt{7}$ B. $x^2 + y^2 = 9$ C. $x^2 + y^2 = 16$
 D. $x^2 + y^2 = 256$ E. $x^2 + y^2 = 7$

11. Given two angles $\frac{f}{6}$ and $\frac{3f}{4}$ radians. What is the **sum** of the angles in degrees?
 A. 165° B. 285° C. 30° D. 345° E. 90°
12. The **horizontal** asymptote of the graph of the function $h(x) = 2 - \frac{3}{x+2}$ is
 A. $y = \frac{1}{2}$ B. $y = -2$ C. $x = \frac{1}{2}$ D. $x = 2$ E. $y = 2$
13. The value of $2 + 3 \sin^2 \theta + 3 \cos^2 \theta$ is:
 A. 0 B. 2 C. 8 D. 5 E. 12
14. Given $r = \frac{-1+\sqrt{5}}{2}$ and $s = \frac{-1-\sqrt{5}}{2}$ then $r^2 + s^2$ equals to:
 A. 5 B. 3 C. $\frac{1}{4}$ D. 4 E. 2
15. The solution of the equation $4 \cos x = -2\sqrt{3}$ between f and $\frac{3f}{2}$ is:
 A. $\frac{f}{6}$ B. $\frac{f}{3}$ C. $\frac{4f}{3}$ D. $\frac{7f}{6}$ E. $\frac{2f}{3}$
16. If $Z = -3i$, Find $\text{Arg}(z)$
 A. $-\frac{f}{4}$ B. $\frac{f}{3}$ C. $-\frac{f}{2}$ D. $\frac{f}{2}$ E. $\frac{2f}{3}$
17. Given $f(x) = x^2 + 2$ and $g(x) = \sqrt{x-2}$, the composite function $fg(x)$ is equal to
 A. x B. 0 C. $x+4$ D. $x-2$ E. \sqrt{x}
18. The value of $\lim_{x \rightarrow -3} \frac{9-x^2}{x+3}$ is:
 A. undefined B. 0 C. 9 D. -3 E. 6
19. If $f(x) = \sin x e^{-2x}$ then $f'(x)$ is equal to:
 A. $\frac{\cos x - \sin x}{e^{2x}}$ B. $\frac{\cos x - 2 \sin x}{e^{2x}}$ C. $-2xe^{2x}$
 D. $\cos x - 2 \sin x$ E. $2 \sin x e^{2x} + x^2 e^{2x}$
20. $\frac{7x-4}{(x-1)^2(x+2)} = \frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{C}{x+2}$, Determine the values of A, B and C
 A. 2, 1, -2 B. 1, 2, -2 C. 2, -2, 1 D. 1, -2, 2 E. 2, 3, 1

21. $3(2^k) + 2^k$ when simplified equals:
- A. 8^k B. 2^{k+2} C. 6^k D. $3(2^{2k})$ E. $4(2^{2k})$
22. The probability that Devina has a handkerchief is 0.54 and the probability that she brings lunch is 0.68. The probability that she has both a handkerchief and lunch is 0.25. What is the probability that Devina will neither have a handkerchief nor has lunch?
- A. 0.03 B. 0.29 C. 0.43 D. 0.68 E. 0.97
23. The value of ${}^{12}C_9$ is:
- A. 120 B. 6 C. 220 D. 720 E. 110
24. Krishneel placed tennis balls in cylindrical containers which contains 3 balls in close fit that is the balls touch the sides, top and bottom of the container. What fraction of the volume of the container is occupied by the balls? (Volume of sphere is $\frac{4}{3}\pi r^3$).
- A. $\frac{1}{3}$ B. $\frac{1}{2}$ C. $\frac{2}{3}$ D. $\frac{4}{3}$ E. $\frac{1}{8}$
25. Solve $3^{2x} - 10 \times 3^x + 9 = 0$
- A. $x = 2$ B. $x = 0$ C. $x = -1$ D. $x = -2$ E. $x = 0$ and $x = 2$
26. Given $5^{x+y} = 25$ and $5^{x+5y} = 125$, what is the value of y?
- A. $\frac{3}{4}$ B. $\frac{7}{4}$ C. $\frac{1}{2}$ D. $\frac{1}{4}$ E. $\frac{1}{8}$
27. $\lim \left(\frac{3+i}{2-i} \right)$ is equal to
- A. 1 B. -1 C. 5 D. $\frac{3}{2}$ E. -2
28. The **lower** bound of the sequence defined by $a_n = \frac{2n+3}{3n}$ is
- A. 1 B. $\frac{2}{3}$ C. $\frac{5}{3}$ D. $-\frac{1}{2}$ E. $-\frac{2}{3}$
29. Two couples, sitting together on a park bench, pose for a photograph. If neither couple wishes to be separated, the number of different possible seating arrangements is
- A. 1 B. 2 C. 3 D. 8 E. 4
30. Identify the roots when $x^4 - 81 = 0, x \in \mathbb{Z}$,
- A. $\{3, 3i, 9, 9i\}$ B. $\{-9, 9, 9i, -9i\}$ C. $\{-3, 3, -3i, 3i\}$ D. $\{3, -3i, -9, -9i\}$ E. Undefined