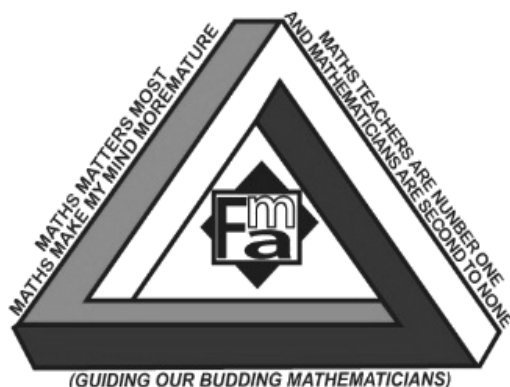


# FIJI MATHEMATICS ASSOCIATION



## FIJI MATHEMATICS COMPETITION (FMC)

**YEAR 11**

**Thursday 1<sup>st</sup> September 2016**

**Time Allowed: 1 Hour 15 minutes**

**Note:**

**Calculators are NOT permitted.**

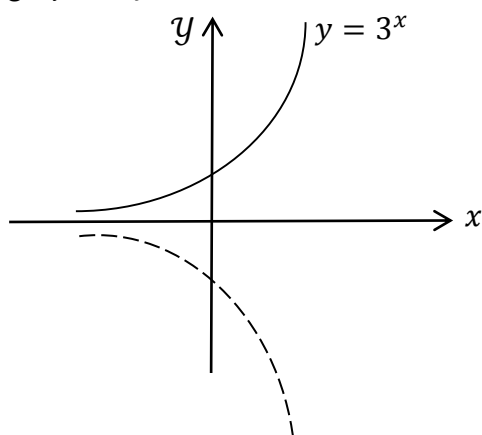
**Diagrams are NOT drawn to scale.**

### **Instructions:**

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

## Year 11

- A binary operation  $*$  is defined on the set of natural numbers as  $a * b = b - a$  where  $a, b \in \mathbb{N}$ . Which of the following shows that  $*$  is not closed on the set of natural numbers  $\mathbb{N}$ ?  
 A.  $2 * 4$                       B.  $1 * 3$                       C.  $4 * 2$                       D.  $6 * 10$                       E.  $3 * 5$
- Anare's father is three times as old as him. The sum of their ages is 56 years. How old is Anare?  
 A. 3 years                      B. 53 years                      C. 14 years                      D. 12 years                      E. 16 years
- $3^0 + 2 \times 0 - 2$   
 A. 0                      B. 3                      C. 1                      D. -1                      E. -2
- If  $A = 2\frac{1}{2}$ ;  $B = 3\frac{3}{4}$  and  $C = \frac{3}{2}$  then, the value of  $\frac{AB}{C}$  will be equal to  
 A.  $4\frac{1}{2}$                       B.  $6\frac{1}{4}$                       C.  $5\frac{1}{4}$                       D.  $\frac{5}{8}$                       E. 6
- \$63 when decreased in the ratio 9:7 is  
 A. \$ 60                      B. \$49                      C. \$47                      D. \$9                      E. \$7
- The mean of 5 quiz scores is 7. What must the 6<sup>th</sup> score be to raise the average of all the scores to 7.5?  
 A. 0.5                      B. 7.5                      C. 8                      D. 9                      E. 10
- What is the value of  $u$  in the sequence 2, 7, 14, 23, 34,  $u$ ?  
 A. 45                      B. 46                      C. 47                      D. 50                      E. 53
- The graph of  $y = 3^x$  is shown on the right. The equation of the broken curve must be:



- $y = 3^{-x}$
- $y = (-3)^x$
- $y = -3^x$
- $y = \left(\frac{1}{3}\right)^x$
- $y = -3^{-x}$

- The matrix without an inverse is

- $\begin{pmatrix} 3 & 0 \\ 0 & 1 \end{pmatrix}$
- $\begin{pmatrix} 4 & -3 \\ 4 & 3 \end{pmatrix}$
- $\begin{pmatrix} 4 & -3 \\ -4 & 3 \end{pmatrix}$
- $\begin{pmatrix} -2 & 0 \\ 0 & -1 \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

## Year 11

10. Which expression does  $(3 + 9 + 27 + 81 + 243)$  equal to?

- A.  $\sum_{i=0}^4 -3i$       B.  $\sum_{i=0}^4 3^i$       C.  $\sum_{i=1}^5 3^i$       D.  $\sum_{i=1}^5 3i$       E.  $\sum_{i=1}^4 3i$

11. What is the value of  $2\cos^2 \theta + 2\sin^2 \theta + 8$  equal to

- A. 6      B. 0      C. 14      D. 8      E. 10

12. The  $n^{\text{th}}$  term of a sequence is given by  $t_n = (-1)^{n+1} \frac{2n}{n^2+1}$ . The third term of the sequence is

- A.  $\frac{4}{5}$       B.  $\frac{-4}{5}$       C.  $\frac{-3}{5}$       D.  $\frac{3}{5}$       E. 2

13. There are 7 sisters. The sisters are born in 7 consecutive years. If the last 3 sisters' ages add to give 42 years, what is the sum of the ages of the other 4 sisters'?

- A. 42 years      B. 54 years      C. 60 years      D. 70 years      E. 30 years

14. An arc of a circle of radius 12cm subtends an angle of  $30^\circ$  at the centre of the circle. The length of the arc is:

- A.  $2\pi$  cm      B.  $12\pi$  cm      C. 6 cm      D. 4 cm      E. 12cm

15. What is the range of the function  $y = \left(\frac{1}{2}\right)^x + 3$

- A.  $\{y : y \in \mathbb{R}\}$       B.  $\{y : y \geq 3, y \in \mathbb{R}\}$       C.  $\{y : y > 3, y \in \mathbb{R}\}$   
D.  $\{y : y \geq 0, y \in \mathbb{R}\}$       E.  $\{y : y > 0, y \in \mathbb{R}\}$

16. For all values of  $x$ ,  $\cos x$  is equal to

- A.  $\sin x$       B.  $\sin \left(x + \frac{\pi}{2}\right)$       C.  $\sin \left(x - \frac{\pi}{2}\right)$       D.  $\sin 2x$       E.  $\sin \left(x - \frac{\pi}{6}\right)$

17. A relation is given as  $y = f(x)$ . Which of the following is the result of reflecting  $f(x)$  in the  $y$  axis.

- A.  $y = f(-x)$       B.  $y = f(x+1)$       C.  $y = f(-x+1)$   
D.  $y = -f(x)$       E.  $y = f(x-1)$

18. A clock strikes once at 1 o'clock, twice at 2 o'clock, thrice at 3 o'clock and so on. How many times will it strike in 24 hours?

- A. 78      B. 136      C. 156      D. 196      E. 206

19. If  $g(t) = (t - 2)^{\frac{1}{2}}$ , then  $g(27)$  and  $g(5)$  when computed will be:

- A.  $\{\sqrt{3}, 5\}$       B.  $\{25, 3\}$       C.  $\{-5, \sqrt{3}\}$       D.  $\{2.5, \sqrt{3}\}$       E.  $\{-3, \sqrt{5}\}$

20. A man's regular pay is \$3 per hour up to 40 hours. Overtime is twice the payment for regular time. If he was paid \$168, how many hours overtime did he work?

- A. 8      B. 16      C. 28      D. 48      E. 56

## Year 11

21. Jeery sells children's tickets for half the adult ticket price. If 5 adult tickets and 8 children's tickets cost a total of \$27, what is the cost of an adult ticket?
- A. \$1.50                      B. \$18                      C. \$9                      D. \$3                      E. \$13.50
22. What is the equation of a line perpendicular to  $3x + 5y = 12$  and having the same x – intercept.
- A.  $y = \frac{5x-20}{3}$                       B.  $y = \frac{3x-20}{5}$                       C.  $y = \frac{-5x+20}{3}$
- D.  $y = \frac{-3x}{5} + 20$                       E.  $y = 12 - 3x$
23. Dipshika purchases some food from bakery. She leaves with a box containing 4 cream cakes and 3 sandwiches. She selects an item of food from the box, eats it and then selects another. What is the probability that both the items she ate were of the same type?
- A.  $\frac{4}{7}$                       B.  $\frac{3}{7}$                       C.  $\frac{2}{7}$                       D.  $\frac{1}{7}$                       E.  $\frac{5}{7}$
24. In simplified form  $3^{n+1} + 3^{n+1} + 3^{n+1}$  equals to
- A.  $9^{n+1}$                       B.  $3^{n+2}$                       C.  $3^{3n+3}$                       D.  $27^{n+1}$                       E.  $9^{3n+3}$
25. Year 11Z visited a zoo. There was a total of 41 zebra and chickens at the zoo. Together in all, they have 100 legs. How many chickens are there?
- A. 9                      B. 32                      C. 64                      D. 18                      E. 54
26. Each day, Jenny ate 20% of the jellybeans that were in her jar at the beginning of that day. At the end of second day, 32 remained. How many jellybeans were in the jar originally?
- A. 40                      B. 50                      C. 55                      D. 60                      E. 75
27. The gradient of the line joining the points A (0,3) and B (-2,j) is  $4\frac{3}{4}$ . The value of j is
- A. 6.5                      B. 6                      C. 0                      D. -6.5                      E. -6
28. Which of the following is equivalent to  $\frac{x-2}{12-3x^2}$
- A.  $-3(2+x)$                       B.  $\frac{1}{-6+x}$                       C.  $\frac{-1}{6+3x}$                       D.  $\frac{x}{6-3x^2}$                       E.  $\frac{2}{6-3x}$
29. If  $a = 2$  and  $b = 3$  then  $(2^{-a} + 2^{-b})^{-1}$  equals
- A.  $\frac{2}{3}$                       B.  $\frac{8}{3}$                       C.  $\frac{1}{12}$                       D.  $\frac{3}{8}$                       E. 12
30. Chandra pays an on-line service provider a fixed monthly fee plus an hourly charge for connect time. Her December bill was \$12.48, but in January her bill was \$17.54 because she used twice as much connect time as in December. What is the fixed monthly fee?
- A. \$2.53                      B. \$5.06                      C. \$6.24                      D. \$7.42                      E. \$8.77