

**Rising Grade 12 Summer 26 Math Packet**

01 The axis of symmetry of a parabola is a line through the focus, parallel to the directrix.

- a) True                      b) False

02 An exponential function of the form  $y = ab^{x-h} + k$  has an x-intercept.

- a) True                      b) False

03 Find the distance between the centers of the circles with equations

$$(x - 5)^2 + (y - 1)^2 = 16 \quad \text{and} \quad (x + 1)^2 + (y - 9)^2 = 9$$

- a) 7                      b) 3                      c) 10                      d) 9

04 Solve the following equation:  $\log(3x + 1) = 2$

- a)  $x = \frac{100}{3}$                       c)  $x = \frac{1}{3}$   
b)  $x = 33$                       d)  $x = 1$

05 Which equation represents a parabola that opens downward?

- a)  $x = 2y^2$                       b)  $y = -2x^2$                       c)  $x = -2y^2$                       d)  $y = 2x^2$

06 What is the length of the major axis of the ellipse:  $16x^2 + 25y^2 = 400$  ?

- a) 16                      b) 32                      c) 25                      d) 20  
b)

07 Simplify the following expression:  $\log_4 16 - \log_4 8$  ?

- a)  $\frac{1}{2}$                       b) 2                      c) 4                      d) 8

08 Which of these conic sections have more than one focus ?

- a) Ellipse and hyperbola                      c) Parabola and ellipse  
b) Circle and ellipse                      d) Circle and Parabola

09 What is the value of :  $\log_4 \frac{1}{64}$  ?

- a) -3                      b) -1/3                      c) 1/3                      d) 3

10 What is the y-intercept of the exponential function below ?

$$y = 4^x - 3$$

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- a) -3                      b) 1                      c) -2                      d) 4
- 11 In a recent poll, 48% of Americans said that they shopped online for at least one holiday gift. If a random sample of 10 Americans is selected, what is the probability that at least 7 shopped online for gift ?
- a) 3,4%                      b) 4.8%                      c) 10.0%                      d) 14.1%
- 12 Andres has a bag that contains 4 red, 6 yellow, 2 blue, and 4 green marbles. If he reaches into the bag and removes a marble without looking, what is the probability that it will not be yellow ?
- a)  $\frac{1}{8}$                       b)  $\frac{1}{4}$                       c)  $\frac{3}{8}$                       d)  $\frac{5}{8}$
- 13 Mr. and Mrs. Davis are planning to have 3 children. The probability of each child being a boy is 50%. What is the probability that they will have 2 boys ?
- 14 a) Solve the following equation using properties of logarithms.  
 $\log_4 x + \log_4 (x - 6) = 2$   
b) Find the extraneous solution of the above equation, if any.
- 15 Write the following exponential equation in logarithm form.  $4^{-3} = \frac{1}{64}$
- 16 For what value of  $x$  is the equation  $4^{3x} = 32^{x-1}$  true ?
- 17 Write an equation for the circle that satisfies the following conditions.  
Center (9, -8), passes through (1, -2)
- 18 Write an equation for the ellipse that satisfies the following conditions.  
Vertices at (-6, 4) and (12, 4), co-vertices at (3, 12) and (3, -4)
- 19 Write an exponential function for the graph that passes through the given points.  
(0, 256) and (4, 81)
- 20 suppose a certain bacteria duplicates to reproduce itself every 20 minutes. If you begin with one cell of the bacteria, how many will there be after 2 hours

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- 21 a) Write the equation :  $x^2 + 8x = 4y - 8$  in standard form.  
b) Find the focus and the directrix  
c) Find the focus and the directrix  
d) Graph the conic section
- 22 a) Write the following equation in standard form :  $x^2 + 4y^2 - 2x + 24y + 21 = 0$   
b) Find the coordinates of the center and foci  
c) Find the lengths of the major and minor axis of the ellipse  
d) Find the coordinates of the vertices and co-vertices  
e) graph the ellipse then find the eccentricity of the ellipse.

23 Students were asking how many MP3 players they own

Players X	Frequency
0	9
1	17
2	9
3	5
4	2

- X. a) Construct and graph a probability distribution for each random variable  
b) Find the expected value of the distribution.  
c) Find the variance and standard deviation of the probability distribution.

24 A biomedical engineering professor warned her students that their upcoming exam would contain some questions from previous exams. Each question from a previous test has a 12% chance of being on the upcoming exam?

Write your answer as a decimal rounded to the nearest thousandth.

25 A restaurant server claims that 88% of the time she leaves candy with the bill, the customer "tips well"

If the server's claim is true, and one day she leaves candy with 2 customers' bill, what is the probability that 0 of those customers will tip well?

Write your answer as a decimal rounded to the nearest thousandth.

26 Hayley created a website where users could randomly generate a "strong password" she claims that 71% of generated password contain at least one capital letter, number, and

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symbol?

If the claim is correct, and a user randomly generates 3 passwords the website, what is the mean of the number of passwords that contain at least on capital letter, number, and symbol

write your answer as a decimal.

- 27 The founders of an online dating website believe there is a 47% chance that a user believes in love at first sight.

If 5 of the website's users are randomly selected to participate in a speed dating event, what is the mean of the number of users who believe in love at first sight?

Write your answer as a decimal.

- 28 Find  $a_1$  and  $a_3$ .

$$a_1 = 2$$

$$a_n = 9a_{n-1}$$

Write your answers as integers or fractions in simplest form.

$$a_2 =$$

$$a_3 =$$

- 29 Find  $a_2$  and  $a_3$ .

$$a_1 = 15$$

$$a_n = a_{n-1} + 4$$

Write your answers as integers or fractions in simplest form.

$$a_2 =$$

$$a_3 =$$

- 30 There are the first six terms of a sequence starting with  $a_1 = 16$ .

16, 25, 34, 43, 52, 61, ...

Find a recursive formula should depend on  $a_{n-1}$

Recursive formula:  $a_n =$

Explicit formula:  $a_n =$

- 31 Use the explicit formula to find a recursive formula for the sequence  $a_n$ . Write your answer in simplest form.

The recursive formula should depend on  $a_{n-1}$

$$a_n = -7n + 16$$

$$a_n =$$





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**A**  $48i - 18j + 38k$

**B**  $48i - 22j + 38k$

**C**  $46i - 22j + 38k$

**D**  $46i - 18j + 38k$

47 Find the component form of  $v$  with the given magnitude and direction angle.

$$|v| = 12, \theta = 60^\circ$$

48 Find the angle  $\theta$  between  $U$  and  $V$  to the nearest tenth of a degree.

$$u = \langle 7, 10 \rangle, \quad v = \langle 4, -4 \rangle$$

49 A set of data with a mean of 45 and a standard deviation of 8.3 is normally distributed. Find the value that is + 1 standard deviations from the mean.

50 Find a unit vector  $u$  with the same direction as  $v$ .

$$V = \langle -6, 8 \rangle$$

51 Find the direction angle of vector  $V$  to the nearest Tenth  $V = 3i + 6j$

52 Find the dot product of  $u$  and  $v$ . then determine if  $u$  and  $v$  are orthogonal

$$u = \langle 9, -3 \rangle, \quad v = \langle 1, 3 \rangle$$

53 the table shows the binomial distribution in example. Find and interpret the mean

<b>X</b>	0	1	2	3	4	5
<b>P(x)</b>	0.116	0.312	0.336	0.181	0.049	0.005

54 The scores on a science project for a class are normally distributed with  $\mu = 78$  and  $\sigma = 7$ . Find each probability.

a.  $P(X \geq 96)$

b.  $P(60 < X < 85)$

55 Find the area of the parallelogram with adjacent sides  $u$  and  $v$

$$u = (-9, 1, 2), \quad v = (6, -5, 3)$$

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56 The number of televisions per household for 100 students is shown.

Televisions	0	1	2	3	4	5
Frequency	1	3	21	53	16	6

- a- Use the frequency distribution to construct and graph a probability distribution for the random variable  $x$ .
- b- Find the mean score and interpret its meaning in the context of the problem situation.
- c- Find the variance and standard deviation of the probability distribution.

57 Ms. Martinez's Spanish class took a poll to find how many drive-through trips students made in a week.

X	0	1	2	3	4	5
Frequency	10	16	12	22	8	2

- a- Use the frequency distribution to the results to construct and graph a probability distribution for the random variable  $x$ . rounding each probability to the nearest hundredth.
- b- Find the mean of the probability distribution.
- c- Find the variance and standard deviation.

58 Find the product of the two Matrices.

$$A = \begin{bmatrix} 2 & 9 \\ -7 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 6 & -4 \\ 0 & 3 \end{bmatrix}$$

59 Find the volume of the parallelepiped with adjacent edges

$$w = 4i - 2j - 2k, \quad u = 2i + 4j - 3k, \quad \text{and} \quad v = i + 5j + 3k$$

60 Find  $A^{-1}$ , if it exists. If  $A^{-1}$  does not exist, write singular.

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$$A = \begin{bmatrix} 3 & 5 \\ -2 & -3 \end{bmatrix}$$

- 61 Find the determinant of the following matrix. Then find the inverse of the matrix, if it exists.

$$A = \begin{bmatrix} 1 & -1 & -2 \\ 5 & 9 & 3 \\ 2 & 7 & 4 \end{bmatrix}$$

- 62 The life of a certain brand of AA battery is normally distributed with  $\mu = 8$  hours and  $\sigma = 1.5$  hours. Find each probability.

- The battery will last less than 6 hours.
- The battery will last more than 12 hours.
- The battery will last between 8 and 9 hours.

- 63 The point p has polar coordinates  $(10, \frac{5\pi}{6})$ . Which of the following is the collection of point P in rectangular coordinates

- a)  $(-5, \sqrt{3}, 5)$       b)  $(-5, 5\sqrt{3})$       c)  $(5, \sqrt{3}, 5)$       d)  $(5, \sqrt{3}, -5)$

- 64 The periodic function f has a period of  $\pi$ . Which of the following could define f(x)?

- a)  $\tan(\frac{1}{2}x)$       b)  $\tan x$       c)  $\tan(2x)$       d)  $\tan \pi x$

- 65 What are the rectangular coordinates (x, y) that give the location of the point polar coordinates  $(r, \theta) = (2, \frac{7\pi}{6})$ ?

- a)  $(-\frac{\sqrt{3}}{2}, -\frac{1}{2})$       b)  $(-\frac{\sqrt{3}}{2}, \frac{1}{2})$       c)  $(-\sqrt{3}, -1)$       d)  $(-\sqrt{3}, 1)$

- 67 The function f and g are given by  $f(\theta) = \csc \theta$  and  $g(\theta) = \sin \theta$ . For what values of  $\theta$  on the interval  $0 \leq \theta \leq 2\pi$  does  $f(\theta) = g(\theta)$ ?

- a)  $\frac{\pi}{2}$  only      b)  $\frac{\pi}{4}$  and  $\frac{5\pi}{4}$       c)  $\frac{\pi}{2}$  and  $\frac{3\pi}{2}$       d)  $0, \pi,$  and  $2\pi$

- 68 The function f is given by  $f(\theta) = \sin \theta$ . Using the fact that  $\frac{\pi}{12} = \frac{\pi}{4} + (-\frac{\pi}{6})$ , what is the value of  $f(\frac{\pi}{12})$ ?

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b)  $-\frac{\sqrt{2}}{4}$       b)  $\frac{\sqrt{2}-1}{2}$       c)  $\frac{\sqrt{6}-\sqrt{2}}{4}$       d)  $\frac{\sqrt{6}+\sqrt{2}}{4}$

69 In the xy plane  $\beta$  is an angle in standard position with its terminal ray in quadrant I. if  $\sin \beta = 0.8$  and  $\cos \beta = 0.6$ , what is the value of  $\cos(2\beta)$ ?

a)  $-2(0.8)(0.6)$       b)  $2(0.8)(0.6)$       c)  $(0.6)^2 - (0.8)^2$       d)  $(0.6)^2 + (0.8)^2$

70 The function f is given by  $f(x) = \sin(2x)$ . and the domain of f is  $-\frac{\pi}{4} \leq x \leq \frac{\pi}{4}$ . which of the following defines  $f^{-1}(x)$ ?

a)  $\frac{1}{2} \arcsin x$  on the interval  $-\frac{1}{2} \leq x \leq \frac{1}{2}$

b)  $\arcsin(\frac{1}{2}x)$  on the interval  $-\frac{1}{2} \leq x \leq \frac{1}{2}$

c)  $\frac{1}{2} \arcsin x$  on the interval  $-1 \leq x \leq 1$

d)  $\arcsin(\frac{1}{2}x)$  on the interval  $-1 \leq x \leq 1$

71 The function f given by  $f(\theta) = 2\cos^2 \theta + 2\sin \theta - 3$ . For what values of  $\theta$  on  $0 \leq \theta \leq 2\pi$  does  $f(\theta) = 0$  ?

a)  $0$  and  $\frac{\pi}{3}$  only      b)  $\frac{\pi}{6}$  and  $\frac{\pi}{2}$  only      c)  $\frac{\pi}{6}, \frac{\pi}{2}$  and  $\frac{5\pi}{6}$       d)  $\frac{\pi}{3}, \frac{5\pi}{6}$ , and  $2\pi$

