*DO NOT OPEN THE EXAMINATION PAPER UNTIL*
*YOU ARE TOLD BY THE SUPERVISOR TO BEGIN*

# Mathematics 3201

## *PRE-PUBLIC EXAMINATION*
## *Version B*

## *JUNE 2014*

**Value: 100 Marks**
**Duration: 3 Hours**

**General Instructions**

This examination consists of two parts. Part I of the exam consists of selected response questions and Part II consists of constructed response questions.

**Selected Response (50 marks)**

Select the letter of the correct response from those provided. Place the **CAPITAL LETTER** of the correct response in the blank space provided on your Selected Response Answer Sheet.

**Constructed Response (50 marks)**

Answer ALL questions fully and concisely in the space provided. Show all work.

**Student Checklist**

***The items below are your responsibility. Please ensure that they are completed.***

- Write your name and teacher's name on the top of this page.
- Write your name, teacher's name, course name and number on the Selected Response Answer Sheet.
- Check the exam to ensure there are no missing pages. There are **20** pages in total.

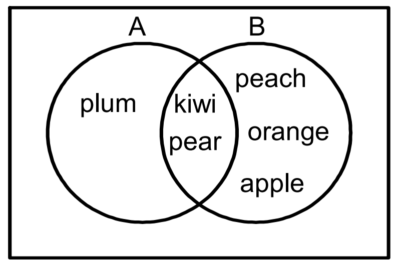
**ALL MATERIALS MUST BE PASSED IN WITH THIS EXAM.**

**Name:** ______________________________

PART I
Total Value: 50%

**Answer all items. Shade the letter of the correct answer on the computer scorable answer sheet.**

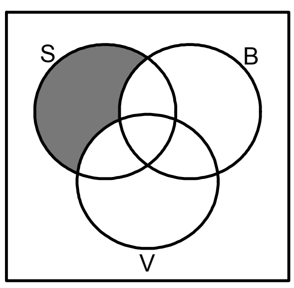
1. Given the Venn diagram below, what is the number of elements in $A$ or $B$, $n(A \cup B)$?



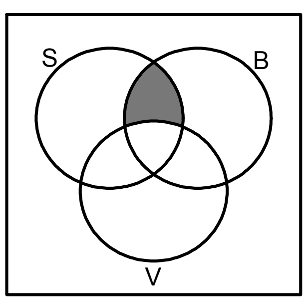

(A) 1
(B) 2
(C) 3
(D) 6

2. Students were surveyed regarding the activities they play in an after school sports program. They chose to play soccer (S), baseball (B), or volleyball (V). Which represents the shading for students that took part in Soccer only?

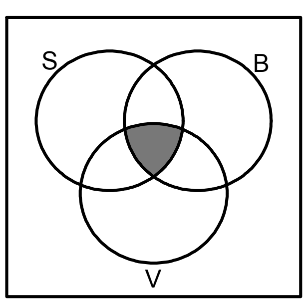
(A)




(B)




(C)

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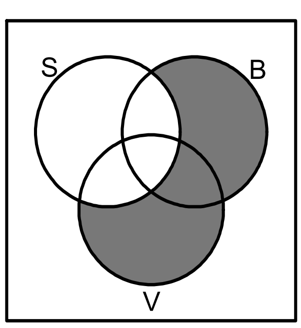


3. There are 26 people in line for a movie. 13 people have popcorn (P), 15 people have a drink (D), 5 people have neither popcorn nor a drink. How many people have both popcorn and a drink, $n(P \cap D)$?

(A) 2

(B) 7

(C) 21

(D) 28

4. Which statement is true for sets A, B, and C?

$$A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$$
$$B = \{3, 6, 9, 12\}$$
$$C = \{20\}$$

(A) A is a subset of B, $A \subset B$

(B) B is a subset of A, $B \subset A$

(C) A is a subset of C, $A \subset C$

(D) C is a subset of A, $C \subset A$

5. The lunch special at a sandwich bar offers you a choice of 6 sandwiches, 4 salads, 6 drinks and 3 desserts. How many different meals are possible if you have to choose one item from each category?

(A) 432

(B) 576

(C) 646

(D) 720

6. How many ways can 7 people line up in a row to buy movie tickets?

(A) 1

(B) 7

(C) 720

(D) 5040

7. A combination lock opens with the correct three-digit code. Each wheel rotates through the digits 1 to 8. Suppose each digit can be used only once in a code. How many different codes are possible when repetition is not allowed?

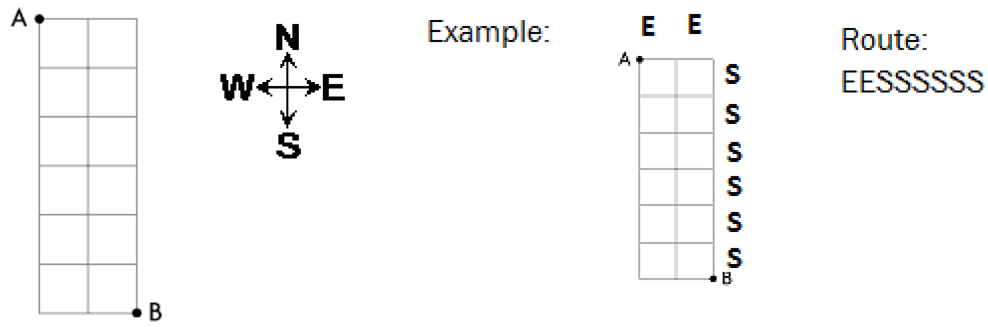
(A) 21

(B) 63

(C) 256

(D) 336

8. How many different routes are there from A to B, if you only travel south or east?




(A) 16
(B) 24
(C) 28
(D) 56

9. How many different arrangements can be made using the letters of the word SUMMER?

(A) 90
(B) 180
(C) 360
(D) 720

10. What is the simplified form of $\frac{(n+1)!}{(n-1)!}$ ?

A. $\frac{1}{n^2+n}$

B. $\frac{1}{n^2+1}$

C. $n^2+1$

D. $n^2+n$

11. Carey Price has stopped 11 of the last 12 penalty shots. What are the odds in favour of him stopping a penalty shot?

(A) 1 : 11
(B) 11 : 12
(C) 12 : 11
(D) 11 : 1

12. Sarah and Mallory are among eight students that must be arranged in a line up for a team photo. Which expression represents the probability that they will be standing next to one another?

(A) $\dfrac{{}_6P_6}{{}_8P_8}$

(B) $\dfrac{{}_7P_7}{{}_8P_8}$

(C) $\dfrac{{}_6P_6 \cdot {}_2P_2}{{}_8P_8}$

(D) $\dfrac{{}_7P_7 \cdot {}_2P_2}{{}_8P_8}$

13. The probability that Lily will make the hockey team is $\frac{3}{5}$. The probability that she will make the volleyball team is $\frac{1}{3}$. If the probability that she will make both teams is $\frac{3}{4}$, what is the probability that she will make at least one of the teams?

(A) $\dfrac{11}{60}$

(B) $\dfrac{8}{15}$

(C) $\dfrac{11}{15}$

(D) $\dfrac{14}{15}$

14. There are 7 red, 1 yellow and 2 blue marbles in a bag. One marble is removed from the back at a time, without replacement. What is the probability the first marble is blue and the second marble is red?

(A) $\dfrac{7}{50}$

(B) $\dfrac{7}{45}$

(C) $\dfrac{9}{10}$

(D) $\dfrac{44}{45}$

15. A jar contains black and white marbles. Two marbles are chosen without replacement. The probability of selecting a black marble and then a white marble is 0.28. The probability of selecting a black marble on the first draw is 0.59. What is the probability of selecting a white marble on the second draw, given that the first marble draw was a black marble, $P(W \mid B)$ ?

(A) 0.17
(B) 0.47
(C) 0.53
(D) 0.87

16. Which rational expression has non-permissible values of −4 and 0 ?

(A) $\frac{-2x^2-4x}{-4x-16}$

(B) $\frac{-2x^2-4x}{-4x+16}$

(C) $\frac{-2x^2-4x}{-4x^2-16x}$

(D) $\frac{-2x^2-4x}{-4x^2+16x}$

17. Which rational expression is the simplified form of $\frac{16h^2-40h}{24h^3}$ ?

(A) $\frac{h-5}{3h^2}, h \neq 0$

(B) $\frac{2h-5}{3h^2}, h \neq 0$

(C) $\frac{2h-10}{6h^2}, h \neq 0$

(D) $\frac{2h-5}{3h}, h \neq 0$

18. Which rational expression is the simplified form of $\frac{3n-1}{n+5} \cdot \frac{2n}{6n-2}$ ?

(A) $\frac{n}{(n+5)(3n-1)}, n \neq -5, \frac{1}{3}$

(B) $\frac{2n}{3n-1}, n \neq -5, \frac{1}{3}$

(C) $\frac{2n}{n+5}, n \neq -5, \frac{1}{3}$

(D) $\frac{n}{n+5}, n \neq -5, \frac{1}{3}$

19. What are the non-permissible values of the variable in $\frac{3}{5g} \div \frac{5g-15}{2g+1}$?

(A) $g \neq 0, -\frac{1}{2}$

(B) $g \neq 0, -\frac{1}{2}, 3$

(C) $g \neq 0, \frac{1}{2}$

(D) $g \neq 0, \frac{1}{2}, 3$

20. Which rational expression is the simplified form of $\frac{2m}{12m^2} + \frac{m}{2}$ ?

(A) $\frac{1+3m^2}{6m}, m \neq 0$

(B) $\frac{m}{12m^2}, m \neq 0$

(C) $\frac{1+6m^2}{12m}, m \neq 0$

(D) $\frac{4m^2}{24m^2}, m \neq 0$

21. Which value of x is the solution to the equation $\frac{3x}{x+1} = 2$ ?

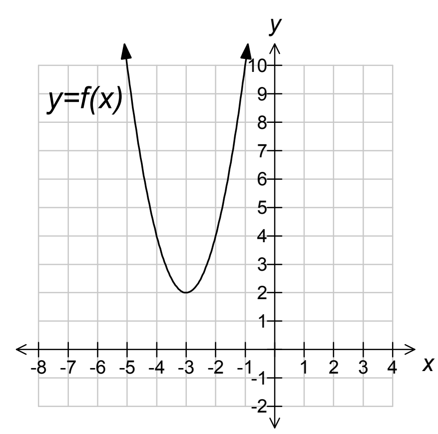
(A) $x = 2$

(B) $x = 3$

(C) $x = 4$

(D) $x = 5$

22. Which choice best describes the graph?




(A) no x intercepts, negative leading coefficient

(B) no x intercepts, positive leading coefficient

(C) one x intercept, negative leading coefficient

(D) one x intercept, positive leading coefficient

23. Which function has a *y*-intercept of−6?

(A) $f(x) = 3x^2 + 2x^2 - 6x + 1$

(B) $f(x) = 3x^2 + 2x^2 + 6x - 1$

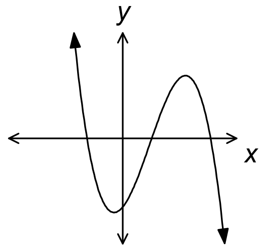
(C) $f(x) = 3x^2 + 2x^2 - x + 6$

(D) $f(x) = 3x^2 + 2x^2 + x - 6$

24. Which graph best represents a function with the characteristics listed below?

- Two x intercepts
- Positive leading coefficient

(A)

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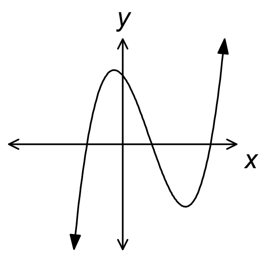


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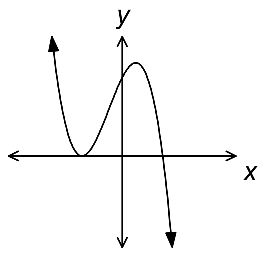


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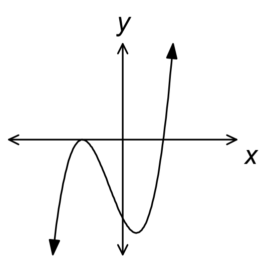
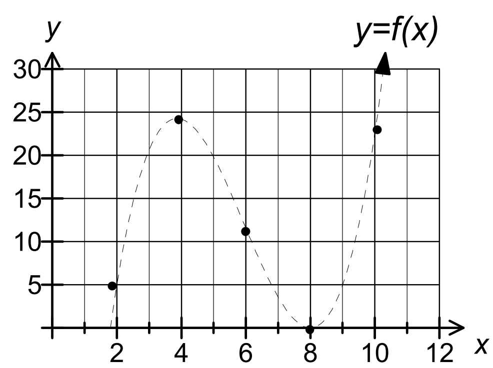



25. Given the scatter plot and the curve of best fit of the polynomial $f(x)$, what is the value of $f(4)$?




(A) 12

(B) 19

(C) 24

(D) 28

26. From which quadrants does the graph of $f(x) = -3x^3 + 2x^2 - 3x + 5$ extend?

(A) II to I

(B) II to IV

(C) III to I

(D) III to IV

27. What is the range of the function $f(x) = 2(x-3)^2 + 4$ ?

(A) $\{y|y \geq 4, y \in R\}$

(B) $\{y|y \leq 4, y \in R\}$

(C) $\{y|y \geq 3, y \in R\}$

(D) $\{y|y \leq 3, y \in R\}$

28. Which function is an increasing exponential function?

(A) $y = 0.5\left(\frac{1}{2}\right)^x$

(B) $y = 2(0.75)^x$

(C) $y = 2\left(\frac{3}{2}\right)^x$

(D) $y = 3(0.5)^x$

29. What is the y-intercept of the exponential function $(x) = 4(½)^x$ ?

(A) None

(B) 0

(C) $\frac{1}{2}$

(D) 4

30. Which value of the variable is the solution to the equation $5^{2x} = \frac{1}{625}$?

(A) −4

(B) −2

(C) 2

(D) 4

31. What is the range of the exponential function $y = 10^x$ ?

(A) $\{y \mid y < 10, y \in R\}$

(B) $\{y \mid y < 0, y \in R\}$

(C) $\{y \mid y > 0, y \in R\}$

(D) $\{y \mid y \in R\}$

32. What is the equation of the exponential regression function for the data.

| $x$ | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| $y$ | 3.5 | 5.6 | 9.0 | 14.2 | 23.1 | 36.7 |

(A) $y = 3.5^x$

(B) $y = 3.5(1.6)^x$

(C) $y = 3.5(2.1)^x$

(D) $y = 5.6(1.6)^x$

33. The population of yeast cells growing in rising bread is modeled by the function, $(t) = 20(3)^{\frac{t}{2}}$ , where $P(t)$ represents the number of yeast cells and $t$ represents the time in minutes after the initial count. How long will it take for the number of bacteria to reach 60 ?

(A) $\frac{1}{2}$ minute

(B) 1 minute

(C) 2 minutes

(D) 3 minutes

34. What is the value of $log_5\left(\frac{1}{625}\right)$ ?

(A) $-125$

(B) $-4$

(C) 4

(D) 125

35. What value of x satisfies the equation $3^{x-2} = 8$ ?

(A) $\frac{\log 3}{\log 8} - 2$

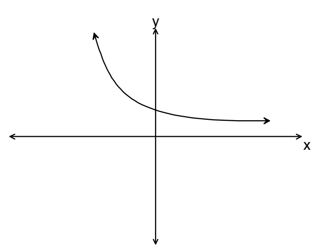
(B) $\frac{\log 3}{\log 8} + 2$

(C) $\frac{\log 8}{\log 3} - 2$

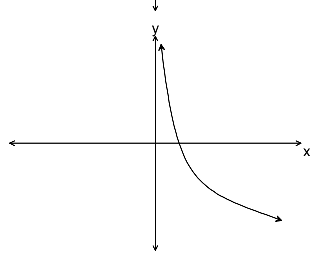
(D) $\frac{\log 8}{\log 3} + 2$

36. Which graph best represents the function $(x) = -3\ln x$ ?

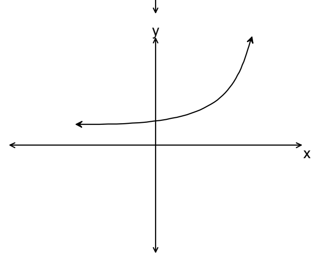
(A)



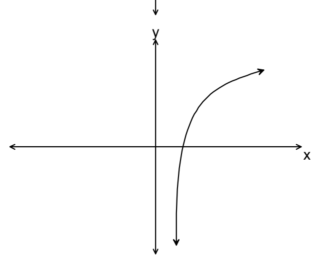

(B)




(C)




(D)



37. What is $4log_5 2 + log_5 4$ written as a single logarithm?

(A) $log_5 12$

(B) $log_5 20$

(C) $log_5 32$

(D) $log_5 64$

38. The equation $A(t) = A_0(2)^{\frac{t}{4}}$ represents the number of bacteria present after t weeks. How many weeks will it take for the number of bacteria to triple?

(A) 1.6

(B) 2.0

(C) 4.0

(D) 6.3

39. What is $6^{-2} = \frac{1}{36}$ written in logarithmic form?

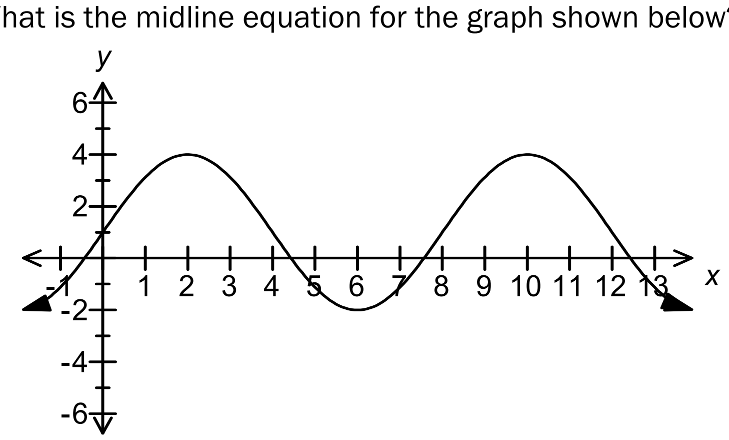
(A) $log_6 \frac{1}{36} = -2$

(B) $log_{\frac{1}{36}} 6 = -2$

(C) $log_6(-2) = \frac{1}{36}$

(D) $log_{-2} 6 = \frac{1}{36}$

40. What is the midline equation for the graph shown below?




(A) $y = -2$

(B) $y = 0$

(C) $y = 1$

(D) $y = 4$

41. What is the range of the function $f(x) = 4cos2(x - 5) - 3$ ?

*(A)* $\{y|1 \le y \le 7, y \in \boldsymbol{R}\}$

(B) $\{y| -7 \le y \le 1, y \in \boldsymbol{R}\}$

(C) $\{y|y \in \boldsymbol{R}\}$

(D) $\{y|y > 0, y \in \boldsymbol{R}\}$

42. The graph of which function has a period of $4\pi$ ?

(A) $y = 2sin\frac{1}{2}x + 3$

(B) $y = 3sin2x - 5$

(C) $y = 4\sin 4x + 1$

(D) $y = 5sin\frac{1}{4}x - 2$

43. What is $405°$ in radians?

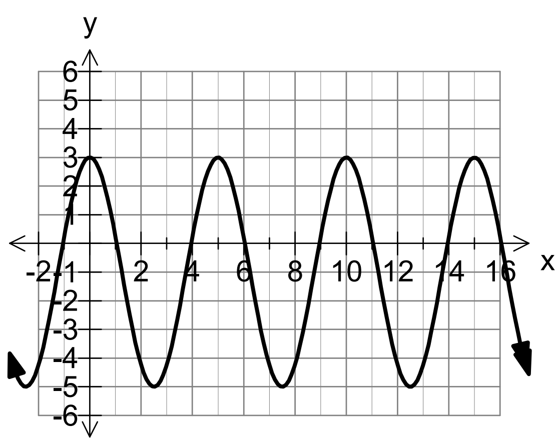
(A) $\frac{3\pi}{4}$

(B) $\frac{5\pi}{4}$

(C) $\frac{7\pi}{4}$

(D) $\frac{9\pi}{4}$

44. What is the amplitude of the function in the graph below?




(A) 3

(B) 4

(C) 5

(D) 8

45. The graph of the function $y = 3\sin 2(x - 180°) + 1$ is translated $90°$ to the right, and 3 units down. Which equation represents the new function?

(A) $y = 3\sin 2(x - 270°) - 2$

(B) $y = 3\sin 2(x - 270°) + 4$

(C) $y = 3\sin 2(x - 90°) - 2$

(D) $y = 3\sin 2(x - 90°) + 4$

46. Josh borrowed $5000 from the bank. The amortization table for his loan is shown below. How much of the second payment went toward paying back his principal?

| Payment Period (month) | Payment ($) | Interest Paid ($) | Balance ($) |
|---|---|---|---|
| 0 | | | 5000 |
| 1 | 689.93 | 112.50 | 4422.57 |
| 2 | 689.93 | 99.51 | 3832.15 |
| 3 | 689.93 | 86.22 | 3228.44 |

(A) $99.51

(B) $212.01

(C) $590.42

(D) $689.93

47. Peter wants to borrow $5000 from his parents over a period of 2 years. They offer him the following options. Which is the best option for Peter?

(A) 5% annual simple interest

(B) 5% compounded annually

(C) 5% compounded monthly

(D) 5% compounded semi annually

48. Mary takes out a bank loan with interest that is compounded semi-annually. The equation that represents her loan is given by: $A = 1000(1.04)^{10}$. How many years did Mary out the loan for?

(A) 1

(B) 4

(C) 5

(D) 10

49. John takes out a $200 000 mortgage for 25 years at 3.75% annual interest compounded monthly. His payments are $1028.26 each month. How much does John actually pay for his home?

(A) $25 706

(B) $200 000

(C) $308 478

(D) $508 478

50. Susie wants to buy a car that costs $25 000. She takes out a loan for 2 years with an annual interest rate and pays a total of $29 160 including interest and the principal. What was her annual interest rate?

(A) 1.08%

(B) 1.1664%

(C) 8%

(D) 16.64%