Science Park High School
Summer Packet

Review of Algebra II Skills
For Students Entering PreCalc

Due the First Day of School

The problems in this packet are designed to help you review topics that are important to your success in PreCalc.

We expect that you come to class knowing this material and ready to continue learning.

Answer all questions on separate sheets of paper. You must SHOW ALL YOUR WORK. This assignment will be collected on the first day of school. It will count as the first grade of the cycle.

Enjoy your summer. See you in September ready to learn!!!
After you work each problem, record your answer on the answer sheet provided or on a piece of paper.

**Multiple Choice**

1. In the figure below, line $L$ is parallel to line $M$. Line $N$ intersects both $L$ and $M$, with angles $a$, $b$, $c$, $d$, $e$, $f$, $g$, and $h$ as shown. Which of the following lists includes all of the angles that are supplementary to $\angle a$?

   A) $b, d, f, h$  
   B) $c, e, g$  
   C) $b, d, c$  
   D) $e, f, g, h$  
   E) $d, c, h, g$

2. In the figure below, what is the area of $\triangle ABC$ in terms of $x$?

   ![Area of Triangle](image)

   A) $10 \sin x$  
   B) $40 \cos x$  
   C) $80 \sin x$  
   D) $40 \cos x$  
   E) $80 \cos x$

3. If $PQRS$ is a parallelogram and $\overline{MN}$ is a line segment, then $x$ must equal

   ![Parallelogram](image)

   A) $180 - b$  
   B) $180 - c$  
   C) $a + b$  
   D) $a + c$  
   E) $b + c$

4. If a rectangular swimming pool has a volume of 16,500 cubic feet, a depth of 10 feet, and a length of 75 feet, what is the width of the pool, in feet?

   A) 22  
   B) 26  
   C) 32  
   D) 110  
   E) 1650

5. \[ \frac{1}{10^{100}} - \frac{1}{10^{99}} = \]

   A) $-\frac{9}{10^{100}}$  
   B) $\frac{1}{10^{100}}$  
   C) $\frac{1}{10^{100}}$  
   D) $\frac{1}{10}$  
   E) $\frac{9}{10}$

6. In the figure, what is the sum of the degree measures of the marked angles?

   A) 180  
   B) 270  
   C) 360  
   D) 540  
   E) It cannot be determined from the information given.

7. If $5x^2 + 6x = 70$ and $5x^2 - 6y = 10$, then what is the value of $10x + 10y$?

   A) 10  
   B) 20  
   C) 60  
   D) 80  
   E) 100

8. In the figure below, if $\overline{AB} \parallel \overline{CD}$, then what is the value of $y$? **Figure not drawn to scale.**

   ![Figure](image)

   A) 30  
   B) 60  
   C) 90  
   D) 120  
   E) 150

9. Given the graph below, if the line $k$ has a slope of $\frac{3}{2}$, what is the $y$-intercept of $k$?

   ![Graph](image)

   A) $-\frac{9}{2}$  
   B) $-2$  
   C) 3  
   D) $\frac{9}{2}$  
   E) 6

10. **Grid-In** If $\ell_1$ is parallel to $\ell_2$ in the figure below, what is the value of $y$?

   ![Grid-In](image)
After you work each problem, record your answer on the answer sheet provided or on a piece of paper.

**Multiple Choice**

11. In a jar of red and green jelly beans, the ratio of green jelly beans to red jelly beans is 5:3. If the jar contains a total of 160 jelly beans, how many of them are red?
   A 30  B 53  C 60
   D 100  E 160

12. If \(a^2b = 12^2\) and \(b\) is an odd integer, then \(a\) could be divisible by all of the following EXCEPT
   A 3  B 4  C 6  D 9  E 12

13. In the figure below, \(\angle A\) and \(\angle ADC\) are right angles, the length of \(\overline{AD}\) is 7 units, the length of \(\overline{AB}\) is 10 units, and the length of \(\overline{DC}\) is 6 units. What is the area, in square units, of \(\triangle DCB\)?
   A 21  B 24  C \(3\sqrt{149}\)
   D 142  E 210

14. A science class has a ratio of girls to boys of 4 to 3. If the class has a total of 35 students, how many more girls are there than boys?
   A 20  B 15  C 7  D 5  E 1

15. Set \(A\) is the set of all positive integers less than 30, and Set \(B\) is the set of all positive multiples of 5. Which set is the intersection of Set \(A\) and Set \(B\)?
   A \{5, 10, 15, 20, 25\}
   B \{10, 20, 30\}
   C \{5, 15, 25\}
   D \{1, 2, 3, 4, 5\}
   E \{5\}

16. What are the \((x, y)\) coordinates of the vertex of the quadratic function \(y = \frac{1}{2}(x - 3)^2 + 4\)?
   A \((-3, -4)\)  B \((0, 0)\)  C \((3, 4)\)
   D \(\left(\frac{9}{2}, 4\right)\)  E \((9, -4)\)

17. In \(\triangle ABC\) below, if \(AC\) is equal to 8, then \(BC\) is equal to
   ![Diagram]
   A \(8\sqrt{2}\)  B 8  C 6
   D \(4\sqrt{2}\)  E \(3\sqrt{2}\)

18. The ratio of \(\frac{\frac{1}{7}}{\frac{1}{5}}\) is equal to the ratio of 100 to
   A \(\frac{20}{7}\)  B 20  C 35  D 100  E 140

19. If there are 4 more nickels in a jar than there are dimes, which could be the ratio of dimes to nickels in the jar?
   A \(\frac{8}{10}\)  B 1  C \(\frac{14}{10}\)
   D 4  E None of the above

20. **Grid-In** Twenty bottles contain a total of 8 liters of apple juice. If each bottle contains the same amount of apple juice, how much juice (in liters) is in each bottle?

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**Internet Connection** SAT/ACT Practice For additional test practice questions, visit: www.amc.glencoe.com

SAT & ACT Preparation 693
After you work each problem, record your answer on the answer sheet provided or on a piece of paper.

**Multiple Choice**

21. If the average (arithmetic mean) of four distinct positive integers is 11, what is the greatest possible value of any one of the integers?
   A 35  B 38  C 40  D 41  E 44

22. Which quadratic equation has roots of \( \frac{1}{2} \) and \( \frac{1}{3} \)?
   A \( 5x^2 - 5x - 2 = 0 \)  B \( 5x^2 - 5x + 1 = 0 \)
   C \( 6x^2 + 5x - 1 = 0 \)  D \( 6x^2 - 6x + 1 = 0 \)
   E \( 6x^2 - 5x + 1 = 0 \)

23. Brad tried to calculate the average of his 5 test scores. He mistakenly divided the correct total \( T \) of his scores by 6. The result was 14 less than what it should have been. Which of the following equations would determine the value of \( T \)?
   A \( 5T + 14 = 6T \)  B \( \frac{T}{6} = \frac{(T - 14)}{5} \)
   C \( \frac{T}{6} - 14 = \frac{T}{5} \)  D \( \frac{(T - 14)}{5} = \frac{T}{5} \)
   E \( \frac{T}{6} + 14 = \frac{T}{5} \)

24. In the figure below, the ratio \( \frac{\text{area of } \triangle ABC}{\tan A} = \)

- A \( \frac{1}{2y^2} \)
- B \( \frac{1}{y^2} \)
- C \( \frac{2}{x^2} \)
- D \( \frac{4}{x^2} \)
- E \( \frac{x^2}{4} \)

25. If the ratio of \( x \) to \( y \) is equal to the ratio of 10 to 2y, then what is the value of \( x? \)
   A \( \frac{1}{5} \)  B 5  C 8  D 12  E 20

26. If the circumference of a circle is \( \frac{2\pi}{3} \), then what is half of its area?
   A \( \frac{\pi}{18} \)  B \( \frac{\pi}{9} \)  C \( \frac{4\pi}{9} \)
   D \( \frac{2\pi^2}{9} \)  E \( \frac{4\pi^2}{9} \)

27. If the average (arithmetic mean) of eight numbers is 20 and the average of five of these numbers is 14, what is the average of the other three numbers?
   A 14  B 17  C 20  D 30  E 34

28. In the triangle below, what is the measure of \( \angle A? \)

   A 9\(^\circ\)  B 18\(^\circ\)  C 36\(^\circ\)  D 54\(^\circ\)  E 108\(^\circ\)

29. \( A \) is the average (arithmetic mean) of three consecutive positive even integers. Which of the following could be the remainder when \( A \) is divided by 6?
   A 1  B 3  C 4  D 5  E It cannot be determined from the information given.

30. **Grid-In** If \( b \) is a prime integer such that \( 3b > 10 > \frac{5}{6} b \), what is one possible value of \( b? \)

**interNRT**

**SAT/ACT Practice**  For additional test practice questions, visit: www.amc.glencoe.com

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**SAT & ACT Preparation 755**
After you work each problem, record your answer on the answer sheet provided or on a piece of paper.

**Multiple Choice**

31. Shanika has a collection of 80 tapes. If 40% of her records are jazz tapes and the rest are blues tapes, how many blues tapes does she have?
   A 32  B 40  C 42  D 48  E 50

32. If \( \ell_1 \) is parallel to \( \ell_2 \) in the figure below, what is the value of \( x \)?

![Diagram of parallel lines]

A 20  B 50  C 70  D 80  E 90

33. There are \( k \) gallons of gasoline available to fill a tank. After \( d \) gallons have been pumped, then, in terms of \( k \) and \( d \), what percent of the gasoline has been pumped?

A \( \frac{100d}{k} \)  B \( \frac{k}{100d} \)  C \( \frac{100k}{d} \)  D \( \frac{k}{100(k - d)} \)  E \( \frac{100(k - d)}{k} \)

34. In 1985, Andrei had a collection of 48 baseball caps. Since then he has given away 13 caps, purchased 17 new caps, and traded 6 of his caps to Pierre for 8 of Pierre's caps. Since 1985, what has been the net percent increase in Andrei's collection?

A 6%  B 12\( \frac{1}{2} \)%  C 16\( \frac{2}{3} \)%  D 25%  E 28\( \frac{1}{2} \)%

35. In the figure below, \( AB = AC \) and \( AD \) is a line segment. What is the value of \( x - y \)?

![Diagram of triangle]

Note: Figure is NOT drawn to scale.

A 10  B 20  C 30  D 70  E 90

36. The current population of Rockville is 20,000. If the population doubles every 8 years, which function represents the number of people in Rockville in \( t \) years?
   A \( f(t) = 20,000 \cdot \left( \frac{t}{8} \right)^{\frac{1}{2}} \)  B \( f(t) = 2 \cdot (20,000)^{\frac{1}{2}} \)  C \( f(t) = \frac{20,000}{8} \)  D \( f(t) = 20,000 \cdot (2)^{\frac{t}{8}} \)  E \( f(t) = 20,000 \cdot \left( \frac{t}{8} \right)^{\frac{1}{2}} \)

37. In the figure, the slope of \( AC \) is \(-\frac{1}{6}\), and \( m\angle C = 30^\circ \). What is the length of \( BC \)?

A \( \sqrt{37} \)  B \( \sqrt{111} \)  C 2  D 2\( \sqrt{37} \)  E It cannot be determined from the information given.

38. If \( x + 6 > 0 \) and \( 1 - 2x > -1 \), then \( x \) could equal each of the following EXCEPT?
   A -6  B -4  C -2  D 0  E \( \frac{1}{2} \)

39. The percent increase from 99 to 100 is which of the following?
   A greater than 1  B 1  C less than 1, but more than \( \frac{1}{2} \)  D less than \( \frac{1}{2} \), but more than 0  E 0

40. **Grid-In** One fifth of the cars in a parking lot are blue, and \( \frac{1}{2} \) of the blue cars are convertibles. If \( \frac{1}{4} \) of the convertibles in the parking lot are blue, then what percent of the cars in the lot are neither blue nor convertibles?
41. A coin was flipped 20 times and came up heads 10 times and tails 10 times. If the first and the last flips were both heads, what is the greatest number of consecutive heads that could have occurred?

A 1  B 2  C 8
D 9  E 10

42. If $4\sqrt{x - 3} + 8 = 32$, what is the value of $x$?

A 9  B 18  C 24  D 36  E 39

43. In a plastic jar there are 5 red marbles, 7 blue marbles, and 3 green marbles. How many green marbles need to be added to the jar in order to double the probability of selecting a green marble?

A 2  B 3  C 5  D 6  E 7

44. The average of 5 numbers is 20. If one of the numbers is 18, then what is the sum of the other four numbers?

A 2  B 20.5  C 82
D 90  E 100

45. If the sum of $x$ and $y$ is an even number, and the sum of $x$ and $z$ is an even number, and $z$ is an odd number, then which of the following must be true?

I. $y$ is an even number
II. $y + z$ is an even number
III. $y$ is an odd number

A I only  B II only  C III only
D I and II  E II and III

46. A bag contains only white and blue marbles. The probability of selecting a blue marble is $\frac{1}{5}$. The bag contains 200 marbles. If 100 white marbles are added to the bag, what is the probability of selecting a white marble?

A $\frac{2}{15}$  B $\frac{7}{15}$  C $\frac{8}{15}$  D $\frac{4}{5}$  E $\frac{13}{15}$

47. In the figure below, $\ell_1 \parallel \ell_2$. Which of the labeled angles must be equal to each other?

A $A$ and $C$  B $D$ and $E$  C $A$ and $B$
D $D$ and $B$  E $C$ and $B$

48. What is the probability of drawing a diamond from a well-shuffled standard deck of playing cards?

A $\frac{1}{52}$  B $\frac{1}{13}$  C $\frac{1}{4}$
D $\frac{4}{13}$  E $\frac{1}{1}$

49. A caterer offers 7 different entrees. A customer may choose any 3 of the entrees for a dinner. How many different combinations of entrees can a customer choose?

A 6  B 35  C 84  D 210  E 840

50. Grid-In If a dart is thrown randomly at the target shown below, what is the probability that it will land in the shaded region?

[Diagram of a dartboard with shaded and unshaded sections]
After you work each problem, record your answer on the answer sheet provided or on a piece of paper.

**Multiple Choice**

51. Based on the graph below, which worker had the greatest percent increase in income from week 1 to week 2?

(D) Dan   
(E) Elsa

52. If \( a = b + bc \), then in terms of \( c \), what does \( \frac{b}{a} \) equal?

(B) \( \frac{1}{c + 1} \)   
(C) \( \frac{1}{c} \)

53. If 0.1% of \( m \) is equal to 10% of \( n \), then \( m \) is what percent of \( 10n \)?

(B) 10%   
(C) 100%

54. \( S \) is the set of all positive numbers \( n \) such that \( n < 100 \) and \( \sqrt{n} \) is an integer. What is the median value of the members of set \( S \)?

(B) 5.5   
(C) 25

55. In the figure, \( D, B, \) and \( E \) are collinear. What is the measure of \( \angle ABC \)?

(C) 50°

56. How many of the scores 10, 20, 30, 35, 35, and 50 are greater than the arithmetic mean of the scores?

(B) 1,   
(C) 2

57. For the scatter plot below, what is the best approximation for the slope of the line of best fit?

(A) 3   
(B) \( \frac{3}{2} \)   
(C) 1   
(D) \( \frac{1}{2} \)   
(E) \( \frac{1}{6} \)

58. Based on the data in the table below, how many employees can this company expect to have by 2007?

<table>
<thead>
<tr>
<th>Year</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Employees</td>
<td>1900</td>
<td>2200</td>
<td>2500</td>
<td>2800</td>
<td>3100</td>
</tr>
</tbody>
</table>

(A) 3100   
(B) 3400   
(C) 3550

(D) 3700   
(E) 4000

59. What is the difference between the median of Set \( A \) and the mean of Set \( B \)?

\( A: \{2, -1, 7, -4, 11, 3\} \)
\( B: \{10, 5, -3, 4, 7, -8\} \)

(A) 2   
(B) 1.5   
(C) 0   
(D) -0.5   
(E) -2

60. **Grid-In** What is the arithmetic mean of the ten numbers below?

\(-820, -65, -32, 0, 1, 2, 3, 32, 65, 820\)

(A) 20°   
(B) 35°   
(C) 50°   
(D) 60°   
(E) 70°
After you work each problem, record your answer on the answer sheet provided or on a piece of paper.

Multiple Choice

61. If \( x \otimes y = \frac{1}{x - y} \), what is the value of \( \frac{1}{2} \otimes \frac{1}{3} \)?
   A 6       B \( \frac{6}{5} \)       C \( \frac{1}{6} \)
   D -1      E -6

62. If one side of a triangle is twice as long as a second side of length \( x \), then the perimeter of the triangle can be:
   A 2x       B 3x       C 4x
   D 5x       E 6x

63. If 3 parallel lines are cut by 3 nonparallel lines, what is the maximum number of intersections possible?
   A 9       B 10       C 11
   D 12      E 13

64. In the figure below, if segment \( \overline{WZ} \) and segment \( \overline{XY} \) are diameters with lengths of 12, what is the area of the shaded region?

\[
\begin{align*}
X & \quad 135^\circ \\
W & \quad Z \\
Y & \\
\end{align*}
\]

A 9       B 18       C 36
D 54      E 108

65. Which of the following represents the values of \( x \) that are solutions of the inequality \( x^2 < x + 6 \)?
   A \( x > -2 \)
   B \( x < 3 \)
   C \(-2 < x < 3 \)
   D \(-3 < x < 2 \)
   E \( x < -2 \) or \( x > 3 \)

66. \( \sqrt{x} = \frac{1}{2}x \) if \( x \) is composite.
   \( \sqrt{x} = 3x \) if \( x \) is prime.
   What is the value of \( \sqrt{\frac{5}{16}} \)?
   A 21       B 23       C 31
   D 46       E 69

67. What is the 37th term in the arithmetic sequence that begins 4, 7, 10, 13?
   A 108      B 111      C 112      D 115      E 144

68. All faces of a cube with a 4-meter edge are painted blue. If the cube is then cut into cubes with 1-meter edges, how many of the 1-meter cubes have blue paint on exactly one face?
   A 24       B 36       C 48
   D 60       E 72

69. For all numbers \( n \), let \( [n] \) be defined as \( n^2 - 1 \). What is the value of \( [x] \)?
   A \( x^2 - 1 \)
   B \( x^4 - 1 \)
   C \( x^4 - 2x^2 - 1 \)
   D \( x^4 - 2x^2 \)
   E \( x^4 \)

70. Grid-In
   Let \( [x] \) be defined for all positive integers \( x \) as the product of the distinct prime factors of \( x \). What is the value of \( \frac{[20]}{[16]} \)?

\[
\frac{[20]}{[16]}
\]

INTERNET CONNECTION SAT/ACT Practice For additional test practice questions, visit: www.amc.glencoe.com

SAT & ACT Preparation 983
Part 2: Short Response

Answer on a separate sheet of paper.

71. Solve this system of equations:
    \[ -x + 2y = 11 \]
    \[ 3x - 2y = -13 \]

72. Solve for x: \( 3(x + 2) + 1 = 2x + 7 + x \)

73. Factor \( 10m^3n^2 - 15m^2n + 25m \) completely.

74. Solve for x: \( 2x^2 - 3x - 2 = 0 \)

75. Find the equation of the line through points (2, 3) and (7, -2).

76. Graph \( y = x^2 + 6x + 1 \).

    Then state the domain and range.

77. Simplify \( \frac{16a^3b^7 + 4a^3b^2 - 8ab}{(8a^3b^2)(2a^{-4}b^{-5})} \).

78. Simplify \( \sqrt{32a^3b^2} \) without using decimals.

79. Solve for x: \( \sqrt{3}x - 4 = 2 \)

80. If \( f(x) = x^2 - 4 \) and \( g(x) = \sqrt{2x + 4} \), find:

    a) \( f(g(0)) \)
    b) \( g(f(0)) \)