

Math 10 Enriched  
Math 10H Final Review

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Find the sum:  $3 + 7 + 11 + \cdots + 91 + 95$

2. Find the sum of the first 21 terms of the series:

$$3 + 13 + 23 + \dots$$

3. Simplify to one common fraction:

$$\left(1 - \frac{1}{4}\right) \left(1 - \frac{1}{5}\right) \left(1 - \frac{1}{6}\right) \left(1 - \frac{1}{7}\right) \cdots \left(1 - \frac{1}{20}\right)$$

4. How many terms are contained in the sequence 5, 9, 13, 17, ..., 601?

5. A sequence of numbers, 1, 1, 3, ..., is formed with the rule  $A_{n+2} = A_{n+1} + 2A_n$ . What is the sixth term?

6. What is the 4,000th term of the sequence 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 5, 6, ...?

7. Express the value of the following as a common fraction:

$$\left(1 - \frac{1}{2}\right) \cdot \left(1 - \frac{1}{3}\right) \cdots \left(1 - \frac{1}{n+1}\right) \cdots \left(1 - \frac{1}{100}\right)$$

8. Find the sum:

$$\frac{1}{1 \times 3} + \frac{1}{3 \times 5} + \frac{1}{5 \times 7} + \cdots + \frac{1}{199 \times 201}$$

9. Find the sum of the infinite geometric series  $6 + 3.6 + 2.16 + 1.296 + \cdots$ .

10. A sequence of numbers  $a_1, a_2, a_3, \dots$  is defined by  $a_1 = 7$ ,  $a_2 = -6$  and  $a_n = a_{n-1} - a_{n-2}$  for  $n > 2$ . What is the sum of the first 2000 terms of the sequence?

11. Compute:  $100^2 - 99^2 + 98^2 - 97^2 + 96^2 - \cdots - 1^2$ .

12. A computer salesperson sold 57 computers during a six-day sale. Each day, she sold 3 computers more than she had sold on the previous day. How many computers did she sell on the first day?

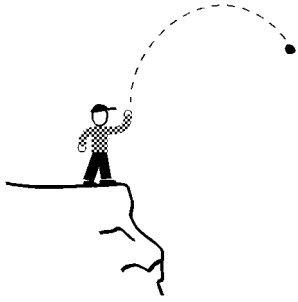
13. Each term of a sequence is generated by adding the two previous terms. What is the sum of the values of the four missing terms in the following sequence?

$$-12, \underline{\quad}, -5, \underline{\quad}, -3, \underline{\quad}, -4, \underline{\quad}, -9, -14, -23$$

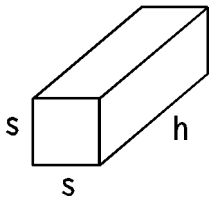
14. Find the 31st term of the arithmetic sequence in which  $t_5 = 3.2$  and  $t_9 = 12.0$ .
15. The 2nd term of an arithmetic sequence is  $m$  and the 3rd term is  $a$ . What is the 6th term?
16. Given the arithmetic sequence,  $(5 - x)$ ,  $(2x - 1)$ ,  $(4x - 4)$ , solve for  $x$  and find  $t_9$ .
17. The sum of the 2nd and 3rd terms of a geometric series is 12. The sum of the 3rd and 4th terms is 108. Determine 1) the ratio of the series; and 2) the 6th term.
18. If  $a - 1$ ,  $a + 3$ , and  $a + 12$  are consecutive terms in a geometric sequence find:
- the value of  $a$
  - the value of  $r$
19. For the geometric sequence  $24, -18, \frac{27}{2}, \dots$  find the following: (round your answers to 1 decimal)
- $t_7$
  - $S_{10}$
20. The sum of the 2nd and 5th terms of a geometric sequence is  $3\frac{1}{2}$ . The sum of the 3rd and 6th is  $-7$ . Determine the ratio  $r$  of the sequence and the first term  $a$ .
21. Solve  $\sum_{i=1}^{\infty} t^i = \frac{1}{5}$  for  $t$ .
22. Solve for  $x$ :  $\sum_{i=3}^7 (ix - 3) = 48$
23. The 2nd term in a geometric sequence is 2 and the 7th term is  $18\sqrt{3}$ . Find all the terms in between.
24. Write a recursive formula for the sequence  $1, \frac{1}{4}, \frac{1}{24}, \frac{1}{192}, \dots$
25. A number is 4 more than its reciprocal. Find the number.
26. Find two numbers whose sum is 10 and product is 18.
27. Find a positive number whose square is 31 more than the number itself.
28. A painting is 12 cm longer than it is wide. Its area is 240 sq cm. What are the dimensions of the painting?
29. Find the sides of a rectangle whose perimeter is 40 and diagonal is 18.

30. A boy throws a rock over the edge of a cliff. The rock is  $h$  feet above the boy after  $t$  seconds, as given by the formula  $h = 48t - 16t^2$ .

- a) What is the height of the rock after 1 second? 3 seconds? 5 seconds?
- b) At what time is the rock at its maximum height?
- c) At what time is the rock 8 feet above the boy?
- d) At what time is the rock 24 feet *below* the boy?



31. A prism, whose height is  $h$ , has a square base of side  $s$ . Its surface area is given by the formula  $S = 2s^2 + 4hs$ . Find  $s$ , if the surface area is 200 square units and the height is 10.



32.  $(t + 4)(t - 4) - 13 = 2(t - 10)$

33.  $7p^2 - 11p = (2p + 1)(3p - 2)$

34. Solve  $5x - 1 = 2x^2$  using the Quadratic Formula.

35. Solve  $6x + 6 = 15x^2$  using the Quadratic Formula.

36. Sketch the graph of  $y = 2(x - 3)^2 + 4$ .

37. Sketch the graph of  $y = -2(x + 3)^2 + 1$ .

38. Put the following in the form  $a(x - h)^2 + k$ :

a)  $y = 2x^2 - 20x + 41$

b)  $y = -x^2 + 14x - 46$

c)  $y = 3x^2 - 2x + \frac{22}{3}$

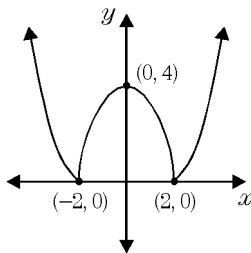
39. Put  $y = Ax^2 + Bx + C$  into the form  $a(x - h)^2 + k$ .

40. The height  $h$  of a stone thrown straight up with a velocity of 14 m/sec is given by the relation  $h = -3t^2 + 14t$ . What is the maximum height the stone will reach?

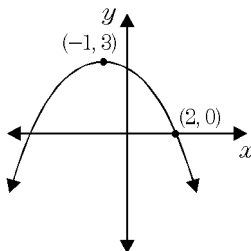
41. A small corral is to be built so that it also has fence splitting the corral into two smaller areas to separate the animals. If there is 60 m of fencing available in which to build this corral, then what is the maximum area that can be enclosed?

42. A right triangle is formed by the  $x$ -axis, the  $y$ -axis, and the line whose equation is  $y = 8 - 2x$ . What is the area of the largest rectangle that can be fitted inside this triangle so that one vertex is at the origin?

43. What is the equation of the given graph?



44. What is the equation of the inverse of the given parabola?



45. A parallelogram has two adjacent sides of 10 cm and 15 cm. It also has an angle of  $75^\circ$ . What is the length of the shorter diagonal? Answer to 1 decimal place.

46. A planet has a radius of 3500 km. A satellite is travelling in an orbit 250 km above the surface. If it completes one orbit every 90 minutes, then what is its speed in kilometres per minute (to the nearest kilometre)?

47. If the point  $P(2, -3)$  is a point on the terminal side of angle  $\theta$  in standard position, then what is the exact value of  $\sec \theta$ ?
48. If the point  $P(-4, 1)$  is a point on the terminal side of angle  $\theta$  in standard position, then what is the exact value of  $\csc \theta$ ?
49. Find the exact value of  $\theta$  if  $8 \sin^3 \theta = 1$  for  $0 \leq \theta < 2\pi^R$ .
50. Find the radian measure of  $\theta$  to 2 decimal places if  $0 \leq \theta < 2\pi^R$  and  $\sec \theta = -1.124$ .
51. Find the radian measure of  $\theta$  to 2 decimal places if  $0 \leq \theta < 2\pi^R$  and  $\sin \theta(2 \sin \theta + 1) = 0$ .
52. A bag contains 7 white, 9 blue and 4 red marbles. If three marbles are pulled from the bag, what is the probability that two are blue and one is red? Express your answer as a common fraction.
53. A board game spinner is divided into three parts labeled A, B and C. The probability of the spinner landing on A is  $\frac{1}{3}$  and on B is  $\frac{5}{12}$ . What is the probability of the spinner landing on C? Express your answer as a common fraction.
54. Joe's batting average is .323. What is the probability that he will get three hits in three at-bats? Express your answer as a decimal to the nearest hundredth.
55. A drawer contains 2 brown and 3 gray socks. The socks are taken out of the drawer one at a time. What is the probability that the fourth sock removed is gray? Express your answer as a common fraction.
56. Two cubes, each numbered with the integers 4 through 9, are tossed. What is the probability that the product of the two numbers rolled is greater than 29 and less than 61? Express your answer as a common fraction.
57. The digits 2, 3, 4, 7 and 8 are each used once to form a five-digit number. What is the probability that the tens digit is odd and the number is divisible by 4? Express your answer as a common fraction.
58. Four dimes and four pennies are randomly placed in a row. What is the probability that the coins at the ends are both pennies? Express your answer as a common fraction.
59. Alex has a  $\frac{3}{10}$  chance of making a free throw. What is the probability that she will make both of her next two free throws? Express your answer as a common fraction.

60. A single ticket is randomly drawn from a set of tickets consecutively numbered 1 through 9999 inclusive. If you have tickets numbered from 5691 through 5699 inclusive, what is your probability of winning? Express your answer as a common fraction.

61. Evaluate:  $\sum_{i=1}^{10} (2 - 3i + 2i^2)$ .

62. Evaluate:  $\sum_{i=1}^{10} (i^2 - 2i + 3)$

63. For what value(s) of  $k$  will the graphs of the equations  $y = x^2 + 2$  and  $y = kx^2 + 4$  intersect in two distinct points?

64. What is the slope of the line passing through the vertices of the graphs of the equations  $y = x^2 - 4x + 3$  and  $y = -x^2 - 4x - 1$ ?

65. If  $f(x) = x^2 - 3x - 6$  and the domain of  $f$  is  $\{-1, 0, 1, 2\}$ , what is the smallest member of the range of  $f$ ?

66. If  $f(x) = \sqrt{x-3}$  and if  $f(a) = 5$ , give the value of  $a$ .

67. If  $f\left(\frac{x+3}{2}\right) = x$ , find  $f(x)$ .

68. Consider the function  $f(x) = x^2$ . Evaluate  $f(f(f(2)))$ .

69. If  $f(x) = x^4 + x^2 + 5x$ , find the value of  $f(5) - f(-5)$ .

70. Consider the function  $g(x) = 2x + 3$ . Evaluate  $g(g(g^{-1}(3)))$

71. Suppose  $f(x) = x^2$  and  $f(g(x)) = 4x^2 + 4x + 1$ . What is  $g(x)$ ?

72. Given that  $f(n) = 3n! - n^2$ , what is  $f(5)$ ?

73. Given that  $g(x) = \frac{2}{x}$ , what is the value of  $g\left(\frac{1}{4}\right) - g\left(-\frac{1}{4}\right)$ ?

74. What is  $f(f(f(3)))$ ?

$$f(n) = \begin{cases} n^2, & \text{if } n \text{ is even;} \\ n + 1, & \text{if } n \text{ is odd.} \end{cases}$$

75. Find the domain of the function  $y = \frac{1}{x}$ .

76. Find the domain of the function  $y = \frac{1}{x+2}$ .

77. What is the domain of  $f(x) = \frac{2}{x^2 - 5x + 6}$ ?

78. Find the domain of  $f(x) = \frac{1}{\sqrt{3+2x}}$ .

79. Find the domain and range of  $f(x) = \sqrt{3 - \sqrt{9-x}}$

80. Let  $f(x) = 7x + 2$  and  $g(x) = x^2 - 9$ . Find  $(f \times g)(x)$ .

81. Let  $f(x) = 6x - 12$  and  $g(x) = x^2 - 4$ . Find  $\left(\frac{f}{g}\right)(x)$ .

82. Suppose  $f(x) = 7x^2 - 3$  and  $g(x) = 9 - 2x$ . Find  $(g \circ f)(x)$ .

83. Suppose  $f(x) = x - 2$  and  $g(x) = \frac{x+5}{3}$ . Find  $(g \circ f)(x)$ .

84. Given  $f(x) = 7x + 2$ , find  $f^{-1}(x)$ .

85. If  $f(x) = \frac{2x+1}{3}$ , then  $f^{-1}(x)$  equals

86. If  $f(x) = 2x^2 + 1$ , where  $x \geq 0$ , then  $f^{-1}(x)$  is equal to

87. Given  $f(x) = \sqrt[3]{1-x}$ , find  $f^{-1}(x)$ .

88. If  $f(x) = 3(x-4)^2 + 2$ ,  $x \leq 4$ , then find  $f^{-1}(x)$ .

89. If  $f(x) = x^2 - 4x + 3$ ,  $x \leq 2$ , then find  $f^{-1}(x)$ .

**Answer List**

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|--------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1. 1176                                                | 2. 2163                                                                              | 3. $\frac{3}{20}$                                                 |
| 4. 150 (terms)                                         | 5. 21                                                                                | 6. 89                                                             |
| 7. $\frac{1}{100}$                                     | 8. $\frac{100}{201}$                                                                 | 9. 15                                                             |
| 10. 1                                                  | 11. 5050                                                                             | 12. 2 (computers)                                                 |
| 13. 3                                                  | 14. 60.4                                                                             | 15. $4a - 3m$                                                     |
| 16. 3, 26                                              | 17. 9, 7873.2                                                                        | 18. $\frac{21}{5}; \frac{9}{4}$                                   |
| 19. 4.3; 12.9                                          | 20. $r = -2, a = \frac{1}{4}$                                                        | 21. $\frac{1}{6}$                                                 |
| 22. $\frac{58}{25}$                                    | 23. $2\sqrt{3}, 6, 6\sqrt{3}, 18$                                                    | 24. $t_1 = 1, t_n = t_{n-1} \times \frac{1}{2n}, n > 1$           |
| 25. $2 \pm \sqrt{5}$                                   | 26. $5 \pm \sqrt{7}$                                                                 | 27. $\frac{1+5\sqrt{5}}{2}$                                       |
| 28. about $10.6 \times 22.6$ cm                        | 29. $10 \pm \sqrt{62}$                                                               | 30. 32, 0, -160 ft; 1.5 sec; about 0.2 and 2.8 sec; about 3.4 sec |
| 31. $-10 + 10\sqrt{2}$                                 | 32. $1 \pm \sqrt{10}$                                                                | 33. $5 \pm \sqrt{23}$                                             |
| 34. $\frac{5 \pm \sqrt{17}}{4}$                        | 35. $\frac{1 \pm \sqrt{11}}{5}$                                                      | 36. [graph]                                                       |
| 37. [graph]                                            | 38. $y = 2(x - 5)^2 - 9;$<br>$y = -(x - 7)^2 + 3;$<br>$y = 3(x - \frac{1}{3})^2 + 7$ | 39. $y = A(x + \frac{B}{2A})^2 + \frac{4AC - B^2}{4A}$            |
| 40. $16\frac{1}{3}$ m                                  | 41. 150 m <sup>2</sup>                                                               | 42. 8 square units                                                |
| 43. $y =  x^2 - 4 $                                    | 44. $x - 3 = -\frac{1}{3}(y + 1)^2$ or equivalent                                    | 45. 15.7 cm                                                       |
| 46. 262                                                | 47. $\frac{\sqrt{13}}{2}$                                                            | 48. $\sqrt{17}$                                                   |
| 49. $\frac{\pi}{6}, \frac{5\pi}{6}$                    | 50. 2.67, 3.62                                                                       | 51. 0, 3.14, 3.67, 5.76                                           |
| 52. $\frac{12}{95}$                                    | 53. $\frac{1}{4}$                                                                    | 54. 0.03                                                          |
| 55. $\frac{3}{5}$                                      | 56. $\frac{11}{18}$                                                                  | 57. $\frac{1}{10}$                                                |
| 58. $\frac{3}{14}$                                     | 59. $\frac{9}{100}$                                                                  | 60. $\frac{1}{1111}$                                              |
| 61. 625                                                | 62. 305                                                                              | 63. $k < 1$                                                       |
| 64. -1                                                 | 65. -8                                                                               | 66. 28                                                            |
| 67. $f(x) = 2x - 3$                                    | 68. 256                                                                              | 69. 50                                                            |
| 70. 9                                                  | 71. $2x + 1$                                                                         | 72. 335                                                           |
| 73. 16                                                 | 74. 256                                                                              | 75. $(-\infty, 0), (0, \infty)$                                   |
| 76. $(-\infty, -2), (-2, \infty)$                      | 77. $x \neq 2$ and $x \neq 3$                                                        | 78. $(-\frac{3}{2}, \infty)$                                      |
| 79. D: $0 \leq x \leq 9$ , R: $0 \leq y \leq \sqrt{3}$ | 80. $7x^3 + 2x^2 - 63x - 18$                                                         | 81. $\frac{6}{x+2}$                                               |
| 82. $15 - 14x^2$                                       | 83. $\frac{x+3}{3}$                                                                  | 84. $\frac{x-2}{7}$                                               |
| 85. $\frac{3x-1}{2}$                                   | 86. $\frac{\sqrt{2x-2}}{2}$                                                          | 87. $1 - x^3$                                                     |
| 88. $-\sqrt{\frac{x-2}{3}} + 4$                        | 89. $-\sqrt{x+1} + 2$                                                                |                                                                   |



**Catalog List**

- |                |                |                |
|----------------|----------------|----------------|
| 1. MCC FB 6    | 2. MCC FB 48   | 3. MCC FB 28   |
| 4. MCC FB 57   | 5. MCC FB 60   | 6. MCC FB 75   |
| 7. MCC FB 83   | 8. MCC FB 91   | 9. MCC FB 137  |
| 10. MCC FB 160 | 11. MCC FB 174 | 12. MCC FB 156 |
| 13. MCC FB 168 | 14. CM1 QB 64  | 15. CM1 QB 66  |
| 16. CM1 QB 68  | 17. CM1 QD 80  | 18. CM1 QD 82  |
| 19. CM1 QE 40  | 20. CM1 QE 42  | 21. CM1 QF 30  |
| 22. CM1 QG 38  | 23. CM1 QJ 62  | 24. CM1 QI 42  |
| 25. ALG NH 1   | 26. ALG NH 11  | 27. ALG NH 8   |
| 28. ALG NH 21  | 29. ALG NH 30  | 30. ALG NH 65  |
| 31. ALG NH 61  | 32. ALG ND 116 | 33. ALG ND 125 |
| 34. CM1 CC 56  | 35. CM1 CC 57  | 36. CM1 EC 55  |
| 37. CM1 EC 56  | 38. CM1 FC 32  | 39. CM1 FC 27  |
| 40. CM1 FE 42  | 41. CM1 FE 48  | 42. CM1 FE 52  |
| 43. CM1 ME 51  | 44. CM1 ME 53  | 45. CM1 HD 42  |
| 46. CM1 IA 64  | 47. CM1 IB 61  | 48. CM1 IB 62  |
| 49. CM1 IC 24  | 50. CM1 IC 30  | 51. CM1 IC 34  |
| 52. MCH ED 265 | 53. MCH ED 267 | 54. MCH ED 269 |
| 55. MCH ED 275 | 56. MCH ED 249 | 57. MCH ED 237 |
| 58. MCH ED 220 | 59. MCH ED 215 | 60. MCH ED 160 |
| 61. SMP DC 36  | 62. SMP DC 35  | 63. MCC BE 79  |
| 64. MCC BE 82  | 65. MCC BF 12  | 66. MCC BF 13  |
| 67. MCC BF 24  | 68. MCC BF 18  | 69. MCC BF 50  |
| 70. MCC BF 42  | 71. MCC BF 67  | 72. MCC BF 86  |
| 73. MCC BF 90  | 74. MCC BF 98  | 75. APC BA 1   |
| 76. APC BA 5   | 77. APC BA 8   | 78. APC BA 22  |
| 79. APC BA 73  | 80. APC BC 1   | 81. APC BC 3   |
| 82. APC BC 7   | 83. APC BC 9   | 84. APC BD 1   |
| 85. APC BD 3   | 86. APC BD 11  | 87. APC BD 17  |
| 88. APC BD 31  | 89. APC BD 33  |                |