

Honors Probability and Statistics

Review Packet

Directions: This packet is to be completed by every student who is enrolled in *Honors Probability and Statistics*. The completed packet must be submitted to the teacher on the Monday of the first full week of class. This packet will be used as part of the first assessment in the course.

19) 93%

20) 58%

21) 50%

22) $66.\overline{6}\%$

23) 20%

24) 80%

25) 71%

26) 30%

Write each as a percent. Use repeating decimals when necessary.

27) $\frac{1}{2}$

28) $\frac{1}{8}$

29) $\frac{2}{3}$

30) $\frac{1}{100}$

31) $2\frac{1}{10}$

32) $\frac{3}{8}$

33) $\frac{1}{10}$

34) $\frac{87}{100}$

Evaluating Variable Expressions

Evaluate each using the values given.

1) $n^2 - m$; use $m = 7$, and $n = 8$

2) $8(x - y)$; use $x = 5$, and $y = 2$

3) $yx \div 2$; use $x = 7$, and $y = 2$

4) $m - n \div 4$; use $m = 5$, and $n = 8$

5) $x - y + 6$; use $x = 6$, and $y = 1$

6) $z + x^3$; use $x = 1$, and $z = 19$

7) $y + yx$; use $x = 15$, and $y = 8$

8) $q \div 6 + p$; use $p = 10$, and $q = 12$

9) $x + 8 - y$; use $x = 20$, and $y = 17$

10) $15 - (m + p)$; use $m = 3$, and $p = 10$

11) $10 - x + y \div 2$; use $x = 5$, and $y = 2$

12) $p - 2 + qp$; use $p = 7$, and $q = 4$

13) $zy + 4y$; use $y = 5$, and $z = 2$

14) $b(a + b) + a$; use $a = 9$, and $b = 4$

15) $p^2 \div 4 - m$; use $m = 3$, and $p = 4$

16) $x(y \div 3)^2$; use $x = 4$, and $y = 9$

17) $4 + m + n - m$; use $m = 4$, and $n = 9$

18) $qp + q - p$; use $p = 7$, and $q = 3$

19) $mn \div 6 + 10$; use $m = 7$, and $n = 6$

20) $h + j(j - h)$; use $h = 2$, and $j = 6$

21) $(b - 1)^2 + a^2$; use $a = 6$, and $b = 1$

22) $y(x - (9 - 4y))$; use $x = 4$, and $y = 2$

23) $x - \left(x - \left(x - y^3 \right) \right)$; use $x = 9$, and $y = 1$

24) $j(h - 9)^3 + 2$; use $h = 9$, and $j = 8$

Finding Slope From an Equation

Find the slope of each line.

1) $y = -\frac{5}{2}x - 5$

2) $y = -\frac{4}{3}x - 1$

3) $y = -x + 3$

4) $y = -4x - 1$

5) $2x - y = 1$

6) $x + 2y = -8$

7) $8x + 3y = -9$

8) $4x + 5y = -10$

9) $x - y = -2$

10) $4x - 3y = 9$

11) $3x + 2y = 6$

12) $4x - 5y = 0$

13) $y = -1$

14) $x + 5y = -15$

15) $-2y - 10 + 2x = 0$

16) $x + 5 + y = 0$

17) $3x + 20 = -4y$

18) $-15 - x = -5y$

19) $-1 = -2x + y$

20) $-x - 1 = y$

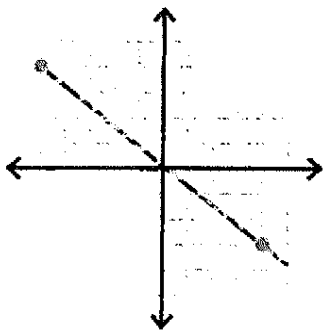
21) $0 = 5y - x$

22) $-30 + 10y = -2x$

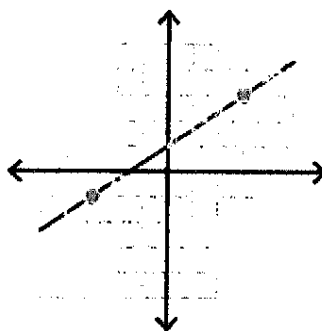
Finding Slope From a Graph

Find the slope of each line.

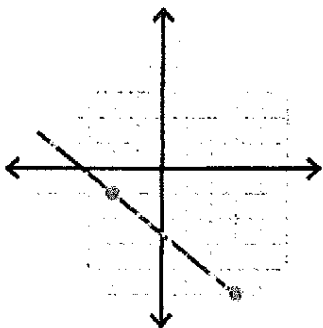
1)



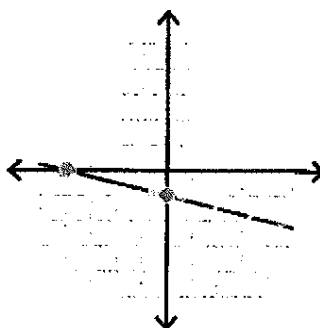
2)



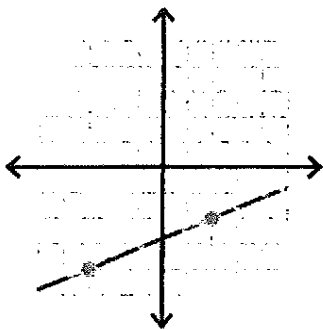
3)



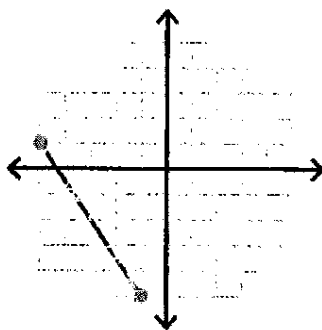
4)



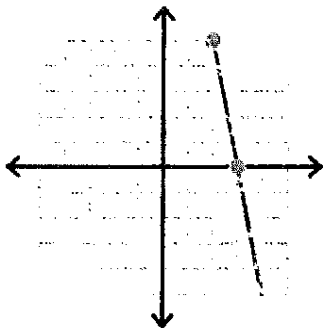
5)



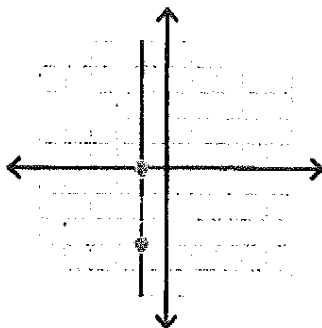
6)



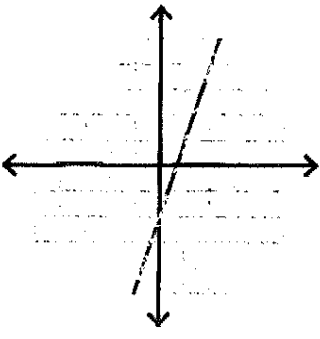
7)



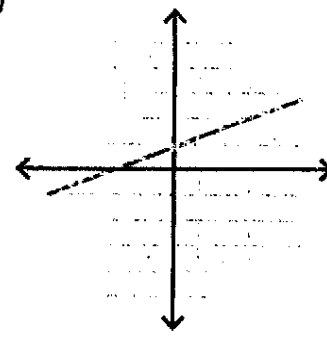
8)



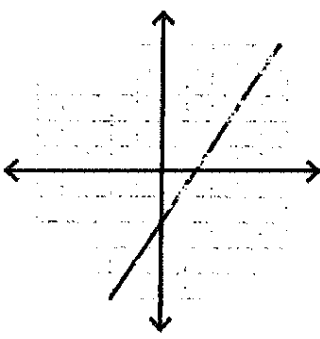
9)



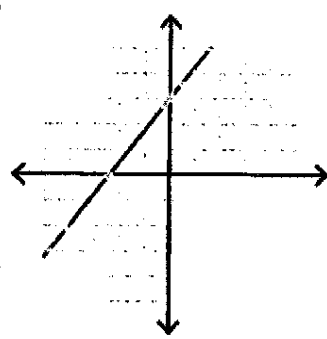
10)



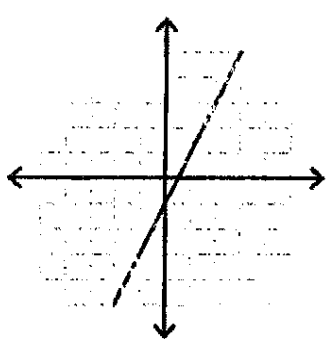
11)



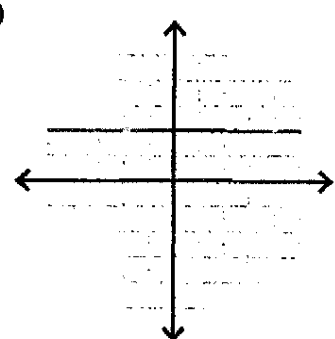
12)



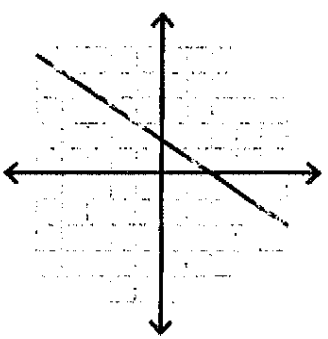
13)



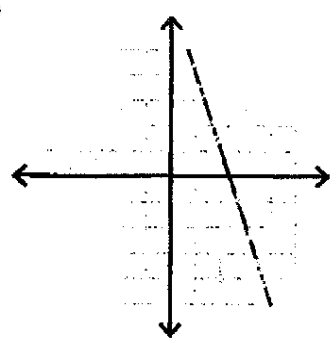
14)



15)



16)



Solving Proportions

Solve each proportion.

$$1) \frac{10}{8} = \frac{n}{10}$$

$$2) \frac{7}{5} = \frac{x}{3}$$

$$3) \frac{9}{6} = \frac{x}{10}$$

$$4) \frac{7}{n} = \frac{8}{7}$$

$$5) \frac{4}{3} = \frac{8}{x}$$

$$6) \frac{7}{b+5} = \frac{10}{5}$$

$$7) \frac{6}{b-1} = \frac{9}{7}$$

$$8) \frac{4}{m-8} = \frac{8}{2}$$

$$9) \frac{5}{6} = \frac{7n+9}{9}$$

$$10) \frac{4}{9} = \frac{r-3}{6}$$

$$11) \frac{7}{9} = \frac{b}{b-10}$$

$$12) \frac{9}{k-7} = \frac{6}{k}$$

$$13) \frac{4}{n+2} = \frac{7}{n}$$

$$14) \frac{n}{n-3} = \frac{2}{3}$$

$$15) \frac{x-3}{x} = \frac{9}{10}$$

$$16) \frac{5}{r-9} = \frac{8}{r+5}$$

$$17) \frac{p+10}{p-7} = \frac{8}{9}$$

$$18) \frac{2}{8} = \frac{n+4}{n-4}$$

$$19) \frac{n-5}{n+8} = \frac{2}{7}$$

$$20) \frac{n-6}{n-7} = \frac{9}{2}$$

LITERAL EQUATIONS WORKSHEET

Solve for the indicated variable in the parenthesis.

1) $P = IRT$ (I)

2) $A = 2(L + W)$ (W)

3) $y = 5x - 6$ (x)

4) $2x - 3y = 8$ (y)

5) $\frac{x+y}{3} = 5$ (x)

6) $y = mx + b$ (b)

7) $ax + by = c$ (y)

8) $A = \frac{1}{2}h(b + c)$ (b)

9) $V = LWH$ (L)

10) $A = 4\pi r^2$ (r^2)

11) $V = \pi r^2 h$ (h)

12) $7x - y = 14$ (x)

13) $A = \frac{x+y}{2}$ (y)

14) $R = IE$ (I)

15) $x = \frac{yz}{6}$ (z)

16) $A = \frac{r}{2L}$ (L)

17) $A = \frac{a+b+c}{3}$ (b)

18) $12x - 4y = 20$ (y)

19) $x = \frac{2y-z}{4}$ (z)

20) $P = \frac{R-C}{N}$ (R)

Arithmetic Mean

Find the arithmetic mean of the following data:

Work Space

5, 8, 1, 4, 3, 9

Mean = _____

4, 7, 12, 9, 8, 10, 8, 6

Mean = _____

3, 0, 2, 5, 3, 6, 9

Mean = _____

24, 45, 67, 21, 99, 56, 34, 91, 83, 15

Mean = _____

2.4, 1.2, 3.5, 5.1, 4.3

Mean = _____

123, 903, 651

Mean = _____

Find the mean for given numbers

Work Space

120, 241, 234, 165, 189, 344 Mean =	
45, 67, 89, 124, 47, 20, 180, 158 Mean =	
12, 462, 90, 120, 111, 42, 80 Mean =	
12.5, 3.4, 18, 1.72, 9.8 Mean =	
1.2, 2.2, 3.2, 4.2, 5.2, 6.2 Mean =	
245, 654, 213, 126, 122, 452, 333, 107 Mean =	

Find the median

Work Space

52, 50, 60, 52, 62, 58, 62, 52, 58, 42 Median =	
36, 54, 59, 82, 20, 61, 48, 78, 84 Median =	
236, 160, 125, 350, 256, 217 Median =	
82, 95, 48, 102, 60, 125, 102, 60 Median =	
170, 125, 100, 200, 150, 225, 185 Median =	
555, 445, 250, 590, 330, 640 Median =	

Find the mode

Work Space

12, 15, 19, 21, 12, 15, 19, 12, 15 Mode =	
25, 25, 28, 23, 23, 21, 26, 25, 23, 21, 23 Mode =	
10, 20, 20, 30, 40, 10, 30, 40, 50, 60, 40 Mode =	
64, 32, 45, 24, 56, 69, 23, 42 Mode =	
21, 12, 12, 12, 21, 12, 21, 21, 21, 12, 12 Mode =	
42, 24, 22, 24, 42, 24, 22, 22, 24, 42, 42 Mode =	

Find the range

Work Space

24, 45, 32, 12, 32, 24, 45, 12

Range =

56, 34, 23, 89, 54, 46, 24, 48, 78

Range =

60, 25, 75, 40, 15, 10, 25, 25, 15

Range =

43, 34, 43, 34, 34, 44, 34, 34, 33

Range =

34, 2, 56, 8, 56, 43, 32, 12, 6, 42, 1, 0

Range =

78, 80, 49, 67, 65, 72, 70, 55, 74, 84, 60

Range =

Mean, Mode, Median, and Range

1) 82, 97, 48, 84, 89, 73, 53, 58

Mean _____ Median _____ Mode _____ Range _____

6) 55, 92, 44, 70, 29

Mean _____ Median _____ Mode _____ Range _____

2) 17, 38, 84, 87, 58, 52, 21

Mean _____ Median _____ Mode _____ Range _____

7) 48, 97, 74, 40, 76

Mean _____ Median _____ Mode _____ Range _____

3) 27, 26, 50, 62, 94, 84, 38, 67

Mean _____ Median _____ Mode _____ Range _____

8) 46, 23, 84, 68, 35, 80, 33, 31

Mean _____ Median _____ Mode _____ Range _____

4) 39, 99, 52, 13, 43, 30, 31, 21

Mean _____ Median _____ Mode _____ Range _____

9) 82, 89, 99, 30, 90

Mean _____ Median _____ Mode _____ Range _____

5) 54, 12, 38, 88, 27, 21, 54

Mean _____ Median _____ Mode _____ Range _____

10) 36, 37, 13, 27, 54, 53, 60

Mean _____ Median _____ Mode _____ Range _____

Worksheet Sigma Notation

Section 1 INTRODUCTION TO SIGMA NOTATION

Sigma notation is used as a convenient shorthand notation for the summation of terms.

Example 1 : We write

$$\sum_{n=1}^5 n = 1 + 2 + 3 + 4 + 5.$$

Here the symbol \sum (sigma) indicates a sum. The numbers at the top and bottom of sigma are called boundaries and tell us what numbers we substitute in to the expression for the terms in our sum. What comes after sigma is an algebraic expression representing terms in the sum. In the example above, n is a variable and represents the terms in our sum.

Example 2 :

$$\sum_{n=1}^5 n^3 = 1^3 + 2^3 + 3^3 + 4^3 + 5^3.$$

Example 3 :

$$\sum_{n=3}^5 n^3 = 3^3 + 4^3 + 5^3.$$

Example 4 :

$$\sum_{n=1}^4 \frac{1}{n} = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4}.$$

Note that we have $\sum_{n=1}^5 n = \sum_{i=1}^5 i$. The n and the i just play the role of dummy variables.

We can also work the other way. Sometimes our sum has a pattern which enables us to write the sum using sigma notation.

Example 5 : Write the expression $3 + 6 + 9 + 12 + \dots + 60$ in sigma notation.

- notice that we are adding multiples of 3;
- so we can write this sum as $\sum_{n=1}^{20} 3n$.

Example 6 : Write the expression $1 + \frac{1}{4} + \frac{1}{7} + \frac{1}{10} + \dots + \frac{1}{3n+1}$ in sigma notation.

- notice that we are adding fractions with a numerator of 1 and denominators starting with 1 in the first term and then increasing by 3 in each subsequent term;
- i.e. the denominator can be represented by $3k + 1$ for $k = 0, 1, \dots, n$;
- so we can write this sum as $\sum_{k=0}^n \frac{1}{3k+1}$.

We can also use sigma notation when we have variables in our terms.

Example 7 : Write the expression $3x + 6x^2 + 9x^3 + 12 + \dots + 60x^{20}$ in sigma notation.

- note from Example 5 the numbers are multiples of 3 and can be represented by $3n$ where $n = 1, 2, \dots, 20$;
- we also have powers of x which increase by 1 in each subsequent term;
- so we can write this sum as $\sum_{n=1}^{20} 3nx^n$.

The numbers in front of the variables are called coefficients. In Example 7 the coefficient of x is 3 and the coefficient of x^2 is 6.

Example 8 : Write the expression $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots + \frac{x^{2n}}{(2n)!}$ in sigma notation.

- here the powers of x are even numbers which can be represented by $2k$ for $k = 0, 1, \dots, n$;
- the denominators are also even numbers but with factorials;
- so we can write this sum as $\sum_{k=0}^n \frac{x^{2k}}{(2k)!}$.

Introduction to Series

Rewrite each series as a sum.

$$1) \sum_{m=1}^5 (4m^2 + 4)$$

$$2) \sum_{k=1}^5 (30 - k^2)$$

$$3) \sum_{n=1}^5 n$$

$$4) \sum_{m=1}^6 (50 - m)$$

$$5) \sum_{a=1}^6 (3a^2 - 2)$$

$$6) \sum_{m=1}^5 (100 - m)$$

$$7) \sum_{m=1}^4 (5m^2 + 4)$$

$$8) \sum_{a=4}^9 (20 - a^2)$$

$$9) \sum_{m=1}^6 \frac{m^2 + 1}{m}$$

$$10) \sum_{n=4}^9 (100 - n)$$

$$11) \sum_{m=0}^5 m(m + 2)$$

$$12) \sum_{k=0}^4 (100 - k)$$

Evaluate each series.

$$13) \sum_{n=1}^7 (40 - n^2)$$

$$14) \sum_{k=1}^5 3k$$

15) $\sum_{a=1}^7 (500 - a)$

16) $\sum_{k=1}^7 (30 - k)$

17) $\sum_{a=0}^5 a$

18) $\sum_{k=0}^4 2k$

19) $\sum_{k=1}^6 k^2$

20) $\sum_{m=1}^5 3m$

Rewrite each series using sigma notation.

21) $1 + 2 + 3 + 4$

22) $3 + 9 + 27 + 81 + 243$

23) $3 + 9 + 27 + 81$

24) $1 + 4 + 9 + 16 + 25$

25) $4 + 8 + 12 + 16$

26) $2 + 4 + 6 + 8 + 10$

27) $\frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6}$

28) $5 + \frac{5}{2} + \frac{5}{3} + \frac{5}{4} + 1$

29) $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6}$

30) $\frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6} + \frac{6}{7}$

Critical thinking questions:

31) Are these equal? Why or why not?

$$\sum_{x=1}^{50} \frac{1}{x} \quad \text{and} \quad \sum_{x=21}^{70} \frac{1}{x-20}$$

32) Rewrite the following so that it starts at $x = 0$

$$\sum_{x=7}^{10} x(x+1)$$