Test Bank for College Algebra with Intermediate Algebra A Blended Course 1st Beecher

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CHAPTER 12 **NAME**_____

TEST FORM A **CLASS**_____**SCORE**_____**GRADE**_____

1. For the sequence whose nth term is $a_n = (-1)^{n+1}\left(2 - \frac{1}{n}\right)^2$, find a_8.

2. Find the first 5 terms of the sequence with general term $a_n = (-1)^{n+1}(3n - 4)$.

3. Find and evaluate: $\sum_{k=1}^{4}\left(k^2 + k\right)$.

Write sigma notation. Answers may vary.

4. $8 + 16 + 24 + 32 + 40$

5. $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \cdots$

6. Find the first 4 terms of the recursively defined sequence $a_1 = 2, a_{n+1} = 3a_n + 5$.

7. Find the 20th term of the arithmetic sequence $32, 28, 24, \ldots$.

8. The 1st term of an arithmetic sequence is –5 and the 12th term is $\frac{1}{2}$. Find the 10th term.

9. Find the sum of the first 20 terms of the series $2 + 12 + 22 + \cdots$.

10. Find the sum: $\sum_{k=1}^{24}(-2k - 1)$.

11. Find the 7th term of the geometric sequence $3, 15, 75, 375, \ldots$.

ANSWERS

1. _____
2. _____
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ANSWERS

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. See work.

12. For a geometric sequence, $r = 2$ and $S_6 = 315$. Find a_1.

Find the sum, if it exists.

13. $\sum_{k=1}^{10} 2^k$

14. $100{,}000 + 80{,}000 + 64{,}000 + \cdots$

15. Find fraction notation for $5.\overline{01}$.

16. *Salvage Value*. The value of a piece of home care equipment is \$3000. Its salvage value each year is 75% of its value the year before. Give a sequence that lists the salvage value of the piece of equipment for each year of a 5-year period.

17. *Hourly Wage*. Jayden accepts a job with a starting hourly wage of \$10.25, and is promised a raise of 20¢ per hour every month for two years. What will Jayden's hourly wage be at the end of the two-year period?

18. *Amount of an Annuity*. To create a college fund, a parent makes a sequence of 15 yearly deposits of \$1200 each in a savings account on which interest is compounded annually at 3.5%. Find the amount of the annuity.

19. Use mathematical induction to prove that, for every natural number n,

$$5 + 10 + 15 + \cdots + 5n = \frac{5n(n+1)}{2}.$$

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CHAPTER 12 **NAME**_____

TEST FORM A

Evaluate.

20. ${}_{12}P_3$ 21. ${}_{13}C_7$ 22. $\binom{n}{4}$

23. How many 4-letter code symbols can be formed with the letters P, R, O, D, U, C, and T without repetition?

24. How many 4-digit codes can be formed using the digits 2, 4, 6, 8, and 0 if the digits:

a) can be repeated?
b) are not repeated and must begin with 4?

25. *Class Representatives*. A class has 80 members. How many sets of 3 representatives can be selected from this group?

26. *Work crews*. There are 9 seniors and 6 juniors in a class. In how many ways can a clean-up crew of 3 seniors and 2 juniors be selected?

27. Expand: $(x-a)^6$.

28. Find the 3rd term of the binomial expansion of $(2x+y)^5$.

29. Determine the number of subsets of a set containing 8 members.

30. *Chocolates*. Suppose we select, without looking or otherwise inspecting, a chocolate from a box that contains 14 cream-filled chocolates and 10 caramel-filled chocolates. What is the probability that we choose a cream-filled chocolate?

ANSWERS

20. _____
21. _____
22. _____
23. _____
24. a)_____
b)_____
25. _____
26. _____
27. _____
28. _____
29. _____
30. _____

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ANSWERS

31. _____

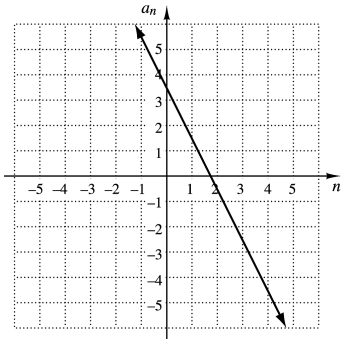
32. _____

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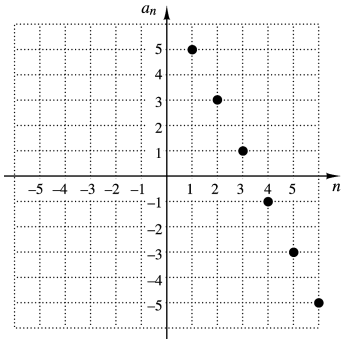
31. *Marbles*. Suppose Jay selects four marbles without looking from a bag containing 4 white marbles, 2 blue marbles, 8 red marbles, and 6 green marbles. What is the probability of getting 1 white marble and 3 red marbles?

32. The graph of the sequence whose general term is $a_n = -2n + 7$ is which of the following?

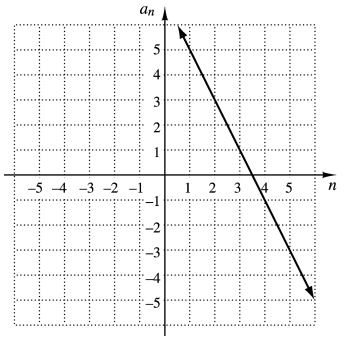
A.



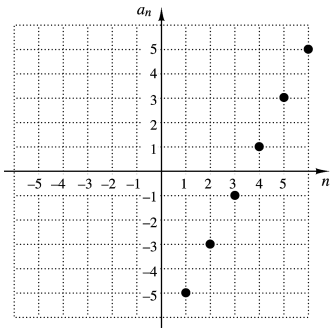
B.



C.



D.



33. Solve for n: ${}_nP_{10} = 3 \cdot {}_nP_9$.

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CHAPTER 12 **NAME**_____

TEST FORM B **CLASS**_____**SCORE**_____**GRADE**_____

1. For the sequence whose *n*th term is $a_n = (-2)^{n-2}(n-1)$, find a_8.

2. Find the first 5 terms of the sequence with general term $a_n = \dfrac{(n-1)(n+2)}{3}$.

3. Find and evaluate: $\sum_{k=1}^{4} \dfrac{2^k}{k+1}$.

Write sigma notation. Answers may vary.

4. $5+10+15+20+25+\cdots$

5. $3 + 9 + 27 + 81 + 243$

6. Find the first 4 terms of the recursively defined sequence $a_1 = 4, a_{n+1} = 2a_n - 1$.

7. Find the 18th term of the arithmetic sequence $3, 7, 11, \ldots$.

8. The 1st term of an arithmetic sequence is –8 and the 15th term is 34. Find the 7th term.

9. Find the sum of the first 20 terms of the series $100 + 75 + 50 + 25 + \cdots$.

10. Find the sum: $\sum_{k=1}^{24} (3k-4)$.

11. Find the 6th term of the geometric sequence $50, 10, 2, \frac{2}{5}, \ldots$.

ANSWERS

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ANSWERS

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. See work.

12. For a geometric sequence, $r = 0.2$ and $S_5 = 4.9984$. Find a_1.

Find the sum, if it exists.

13. $\sum_{k=1}^{7} 3^k$

14. $2 + \frac{5}{2} + \frac{25}{8} + \cdots$

15. Find fraction notation for $3.\overline{15}$.

16. *Salvage Value*. The value of a piece of home care equipment is \$4200. Its salvage value each year is 70% of its value the year before. Give a sequence that lists the salvage value of the piece of equipment for each year of a 5-year period.

17. *Hourly Wage*. Dakota accepts a job with a starting hourly wage of \$10.30. He is promised a raise of 30¢ per hour every two months for the next two years. What will his hourly wage be at the end of the two-year period?

18. *The Economic Multiplier*. The government is making a $\$30{,}000$ expenditure for environmental education. If 35% of this is spent again, and so on, what is the total effect on the economy?

19. Use mathematical induction to prove that, for every natural number n,
$5 + 9 + 13 + \cdots + (4n + 1) = n(2n + 3)$.

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CHAPTER 12 **NAME**_____

TEST FORM B

Evaluate.

20. ${}_{13}P_5$ 21. ${}_{10}C_7$ 22. $\binom{n}{3}$

23. How many 5-letter code symbols can be formed with the letters F, A, C, T, O, and R without repetition?

24. How many 4-digit codes can be formed using the digits 2, 4, 6, 8, and 0 if the digits:

a) can be repeated?
b) are not repeated and must end with 6?

25. *Class Representatives*. A class has 35 members. How many sets of 2 representatives can be selected from this group?

26. *Youth Sports*. A youth sports team has 7 defense players and 8 offense players. How many ways can the coach choose 3 defense players and 5 offense players?

27. Expand: $(x-d)^5$.

28. Find the 4th term of the binomial expansion of $(p+q)^{10}$.

29. Determine the number of subsets of a set containing 5 members.

30. *Card drawing*. Suppose we draw a card from a well-shuffled deck of 52 cards. What is the probability of drawing a jack?

ANSWERS

20. _____

21. _____

22. _____

23. _____

24. a)_____

b)_____

25. _____

26. _____

27. _____

28. _____

29. _____

30. _____

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ANSWERS

31. _____

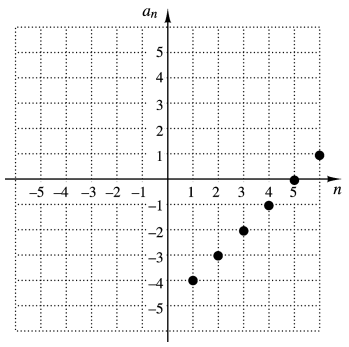
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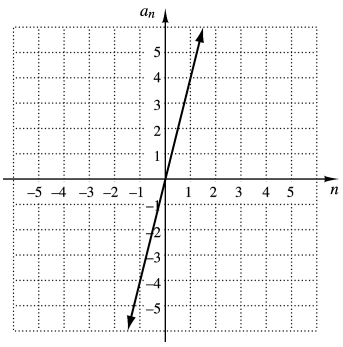
31. *Marbles*. Suppose Jay selects three marbles without looking from a bag containing 10 white marbles, 5 blue marbles, 3 red marbles, and 6 green marbles. What is the probability of getting 1 red marble, 1 white marble, and 1 blue marble?

32. The graph of the sequence whose general term is $a_n = n - 4$ is which of the following?

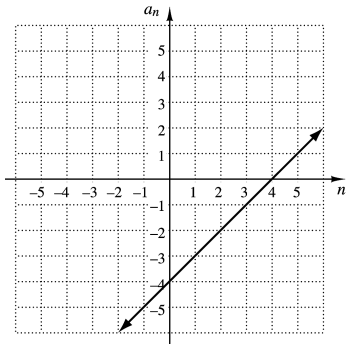
A.



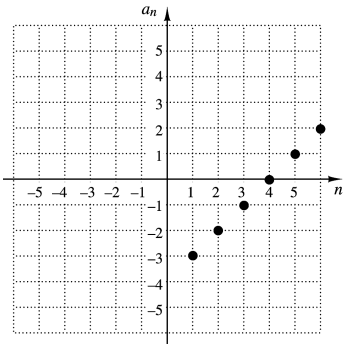
B.



C.



D.



33. Solve for n: $\binom{n}{6} = 2\binom{n-1}{5}$.

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CHAPTER 12 **NAME**_____

TEST FORM C **CLASS_____SCORE_____GRADE_____**

1. For the sequence whose *n*th term is $a_n = (-1)^n(3n+2)$, find a_6.

2. Find the first 5 terms of the sequence with general term $a_n = \dfrac{2n-1}{n}$.

3. Find and evaluate: $\sum_{k=1}^{4} \dfrac{k}{2}$.

Write sigma notation. Answers may vary.

4. $-3+6-9+12-15+\cdots$

5. $\dfrac{3}{2}+\dfrac{3}{4}+\dfrac{3}{8}+\dfrac{3}{16}+\dfrac{3}{32}$

6. Find the first 4 terms of the recursively defined sequence $a_1 = 10, a_{n+1} = \dfrac{1}{2}a_n + 1$.

7. Find the 12th term of the arithmetic sequence $\dfrac{3}{4}, \dfrac{5}{4}, \dfrac{7}{4}, \ldots$.

8. The 1st term of an arithmetic sequence is 21 and the 12th term is 26.5. Find the 6th term.

9. Find the sum of the first 20 terms of the series $-5+5+15+\cdots$.

10. Find the sum: $\sum_{k=1}^{24}(4k-2)$.

11. Find the 6th term of the geometric sequence $2, -6, 18, -54, \ldots$.

ANSWERS

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CHAPTER 12 **NAME**_____

TEST FORM C

ANSWERS

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. See work.

12. For a geometric sequence, $r = 2$ and $S_4 = 45$. Find a_1.

Find the sum, if it exists.

13. $\sum_{k=1}^{6} 4^k$

14. $60 + 40 + \frac{80}{3} + \cdots$

15. Find fraction notation for $0.\overline{74}$.

16. *Salvage Value*. The value of a piece of home care equipment is \$2000. Its salvage value each year is 60% of its value the year before. Give a sequence that lists the salvage value of the piece of equipment for each year of a 5-year period.

17. *Hourly Wage*. Barry accepts a job with a starting hourly wage of \$12.95. He is promised a raise of 60¢ per hour every 4 months for the next two years. What will his hourly wage be at the end of the two-year period?

18. *Earnings*. Suppose someone offered you a job for five years under the following conditions. You will be paid \$5 for the first month, \$7 for the second, and \$9.80 for the third, and so on, earning 40% more each month. How much would you earn altogether?

19. Use mathematical induction to prove that for every natural number n,

$$1 + 2 + 2^2 + \cdots + 2^{n-1} = 2^n - 1.$$

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CHAPTER 12 **NAME**_____

TEST FORM C

Evaluate.

20. ${}_{13}P_9$ 21. ${}_{20}C_9$ 22. $\binom{n}{5}$

23. How many 4-letter code symbols can be formed with the letters E, X, P, A, N, and D without repetition?

24. How many 3-digit codes can be formed using the digits 2, 4, 6, 8, and 0 if the digits:

a) can be repeated?
b) are not repeated and must begin with 8?

25. *Class Representatives*. A class has 60 members. How many sets of 3 representatives can be selected from this group?

26. *School Committees*. Suppose a school community has 9 teachers and 100 students. How many committees can be formed consisting of 2 teachers and 5 students?

27. Expand: $(x-2)^5$.

28. Find the 3rd term of the binomial expansion of $(s+t)^7$.

29. Determine the number of subsets of a set containing 6 members.

30. *Card drawing*. Suppose we draw a card from a well-shuffled deck of 52 cards. What is the probability of drawing a face card (jack, queen, or king)?

ANSWERS

20. _____
21. _____
22. _____
23. _____
24. a)_____
b)_____
25. _____
26. _____
27. _____
28. _____
29. _____
30. _____

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ANSWERS

31. _____

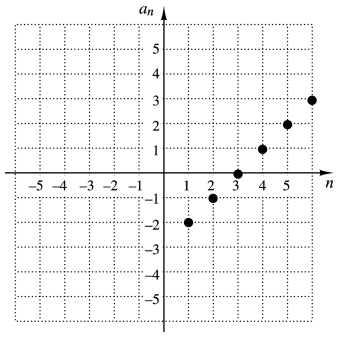
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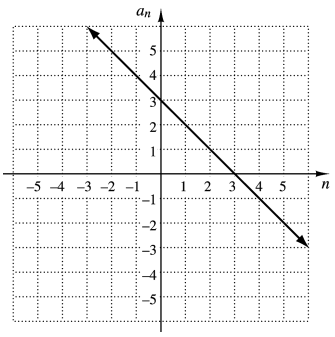
31. *Marbles*. Suppose Jay selects four marbles without looking from a bag containing 10 white marbles, 5 red marbles, 3 blue marbles, and 2 green marbles. What is the probability of getting 3 blue marbles and 1 red marble?

32. The graph of the sequence whose general term is $a_n = n - 3$ is which of the following?

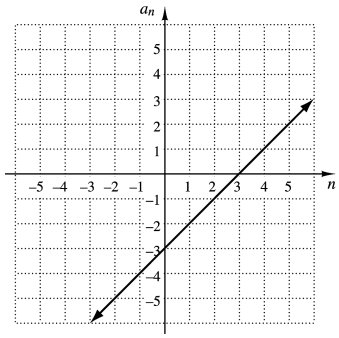
A.



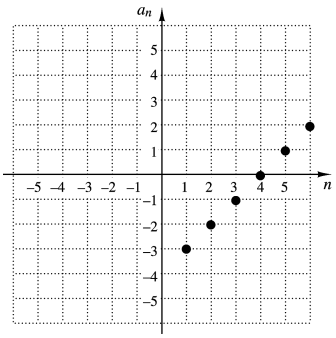
B.



C.



D.



33. Solve for n: $\binom{n}{5} = \binom{n-1}{6}$.

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CHAPTER 12 **NAME**_____

TEST FORM D **CLASS**_____**SCORE**_____**GRADE**_____

1. For the sequence whose nth term is $a_n = (-1)^{n-1}\frac{n}{2}(2n+1)$, find a_8.

2. Find the first 5 terms of the sequence with general term $a_n = \frac{(-1)^n(4n+3)}{n}$.

3. Find and evaluate: $\sum_{k=1}^{4}\frac{2k-1}{k^2}$.

Write sigma notation. Answers may vary.

4. $(-1)+2+(-3)+4+(-5)+6$

5. $6+12+18+24+30+\cdots$

6. Find the first 4 terms of the recursively defined sequence $a_1 = 0.5$, $a_{n+1} = 4+2a_n$.

7. Find the 17th term of the arithmetic sequence $12, 7, 2, \ldots$.

8. The 1st term of an arithmetic sequence is -8 and the 15th term is -1. Find the 5th term.

9. Find the sum of the first 20 terms of the series $12+8+4+\cdots$.

10. Find the sum: $\sum_{k=1}^{24}(-3k+1)$.

11. Find the 8th term of the geometric sequence $-4, 6, -9, \frac{27}{2}, \ldots$.

ANSWERS

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2. _____

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6. _____

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8. _____

9. _____

10. _____

11. _____

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ANSWERS

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. See work.

12. For a geometric sequence, $r = 2$ and $S_8 = -63.75$. Find a_1.

Find the sum, if it exists.

13. $\sum_{k=1}^{10} 3^k$

14. $-16 + (-8) + (-4) + \cdots$

15. Find fraction notation for $2.\overline{09}$.

16. *Salvage Value*. The value of a piece of home care equipment is \$1200. Its salvage value each year is 75% of its value the year before. Give a sequence that lists the salvage value of the piece of equipment for each year of a 5-year period.

17. *Hourly Wage*. Aidan accepts a job with a starting hourly wage of \$17.50. He is promised a raise of 80¢ per hour every three months for the next two years. What will his hourly wage be at the end of the two-year period?

18. *Bouncing Tennis Ball*. A tennis ball is dropped from a height of 12 ft and always rebounds $\frac{2}{3}$ of the distance fallen. How far (up and down) will the ball have traveled when it hits the pavement for the 5th time?

19. Use mathematical induction to prove that for every natural number n,

$$1^2 + 2^2 + 3^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}.$$

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CHAPTER 12 **NAME**_____

TEST FORM D

Evaluate.

20. ${}_{10}P_4$ 21. ${}_{12}C_2$ 22. $\binom{n}{3}$

23. How many 4-letter code symbols can be formed with the letters P, R, I, M, E, and S without repetition?

24. How many 5-digit codes can be formed using the digits 2, 4, 6, 8, and 0 if the digits:

a) can be repeated?
b) are not repeated and must begin with 6?

25. *Class Representatives*. A class has 40 members. How many sets of 4 representatives can be selected from this group?

26. *Dinner Specials*. For a particular special, a diner can choose one appetizer, one entrée, and one dessert. The restaurant offers choices from 4 appetizers, 3 entrees, and 2 desserts. In how many ways can a dinner special be formed?

27. Expand: $(a-2)^5$.

28. Find the 4th term of the binomial expansion of $(3x+y)^4$.

29. Determine the number of subsets of a set containing 7 members.

30. *Socks*. Your sock drawer contains 8 black, 3 blue, 2 brown, and 2 white pairs of socks which are rolled into matching pairs. In the dark, you select a pair of socks. What is the probability that you select a pair that is white?

ANSWERS

20. _____
21. _____
22. _____
23. _____
24. a)_____
b)_____
25. _____
26. _____
27. _____
28. _____
29. _____
30. _____

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ANSWERS

31. _____

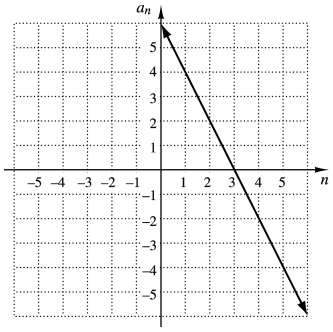
32. _____

33. _____

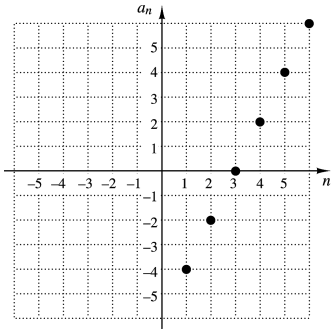
31. *Marbles*. Suppose Jay selects four marbles without looking from a bag containing 5 white marbles, 3 blue marbles, 8 red marbles, and 2 green marbles. What is the probability of getting 1 blue marble and 3 red marbles?

32. The graph of the sequence whose general term is $a_n = 6 - 2n$ is which of the following?

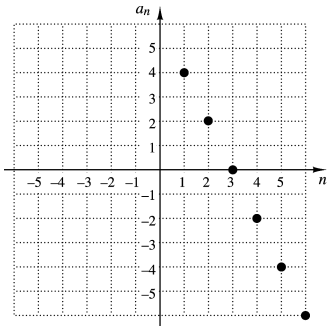
A.



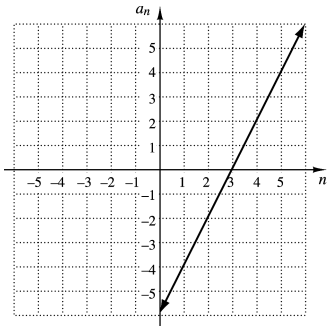
B.



C.



D.



33. Solve for n: $\binom{n}{n-2} = 15$.

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CHAPTER 12 **NAME**_____

TEST FORM E **CLASS_____SCORE_____GRADE_____**

1. For the sequence whose *n*th term is $a_n = n(n-2)^3$, find a_7.
   a) 875 b) 1728 c) 2345 d) 105

2. Find and evaluate: $\sum_{k=1}^{4} \frac{(-1)^{k+1}}{2k}$.
   a) $-\frac{1}{8}$ b) $-\frac{7}{24}$ c) $\frac{5}{12}$ d) $\frac{7}{24}$

3. Find sigma notation for $1+2+4+8+16+32$.
   a) $\sum_{k=1}^{5} 2^k$ b) $\sum_{k=1}^{6} 2^{k-1}$ c) $\sum_{k=1}^{6} 2^k$ d) $\sum_{k=1}^{\infty} 1 \cdot 2^{k-1}$

4. Find sigma notation for $4-6+8-10+12-14+\cdots$.
   a) $\sum_{n=2}^{6} 2^n$ b) $\sum_{n=2}^{\infty} 2(n-2)$
   c) $\sum_{n=2}^{\infty} (-1)^n 2n$ d) $\sum_{n=2}^{\infty} (-1)^{n+1} 2n$

5. Find the 4th term of the recursively defined sequence
   $a_1 = \frac{1}{2}, a_{n+1} = 3a_n + 2$.
   a) 14 b) $39\frac{1}{2}$ c) 63 d) $3\frac{7}{8}$

6. Find the 19th term of the arithmetic sequence $\frac{3}{4}, \frac{5}{4}, \frac{7}{4}, \ldots$.
   a) $\frac{41}{4}$ b) $\frac{43}{4}$ c) $\frac{39}{4}$ d) $\frac{19}{2}$

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7. The 1st term of an arithmetic sequence is -12 and the 20th term is 64. Find the 5th term.

a) $-\frac{20}{19}$ b) 4 c) $\frac{32}{19}$ d) $-\frac{8}{5}$

8. Find the sum of the first 20 terms of the series $20+15+10+\cdots$.

a) -600 b) -1100 c) -750 d) -550

9. Find the sum $\sum_{k=1}^{20}(-3k+5)$.

a) –530 b) –55 c) –1060 d) 990

10. Find the 6th term of the geometric sequence $100, 80, 64, \ldots$.

a) $\frac{16{,}384}{625}$ b) $\frac{1024}{25}$ c) $\frac{4096}{125}$ d) $\frac{8192}{25}$

11. For a geometric sequence, $r=\frac{1}{4}$ and $S_4=-2.65625$. Find a_1.

a) $-\frac{8}{3}$ b) –2 c) –8 d) $-\frac{85}{12}$

12. Find the sum: $\sum_{k=1}^{8}(-1)^k 3^k$.

a) 4920 b) –9840 c) –1641 d) –4920

13. Find the sum, if it exists: $4+1+\frac{1}{4}+\cdots$.

a) 16 b) $\frac{16}{3}$ c) 6 d) Does not exist

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14. When $0.\overline{72}$ is expressed in simplified fraction notation, what is the denominator?

a) 72 b) 8 c) 11 d) 9

15. *The Economic Multiplier*. The government is making a $\$3{,}200{,}000$ expenditure for restoration of covered bridges. If $45\,\%$ of this is spent again, and so on, what is the total effect on the economy? Round to the nearest dollar.

a) \$7,111,111 b) \$1,760,000
c) \$4,640,000 d) \$5,818,182

16. A garden has 4 plants in the first row, 5 in the second row, 6 in the third row, and so on for 10 rows. How many plants are there altogether?

a) 14 plants b) 17 plants c) 85 plants d) 170 plants

17. *Bouncing Ball*. A ball is dropped from a height of 250 cm and always rebounds $\frac{3}{5}$ of the distance fallen. How far does it reach the 6th time it rebounds?

a) 6.9984 cm b) 19.44 cm
c) 11.664 cm d) 150 cm

18. If possible, evaluate the statement:
$2n < n^2$, for $n = 1, 2, 3, \ldots$.

a) It is sometimes true. b) It is never true.
c) It is always true. d) It is not possible to evaluate.

19. Find S_{k+1}, the $(k+1)^{\text{st}}$ statement in the mathematical induction proof of $4 + 8 + 12 + \cdots + 4n = 2n(n+1)$ for $n = 1, 2, 3, \ldots$.

a) $4 + 4k = 2k(k+1)$
b) $4 + 8 + 12 + \cdots + 4k - 2k(k+1) = 2(k+1)(k+2)$
c) $4 + 8 + 12 + \cdots + 4k = 2k(k+1)$
d) $4 + 8 + 12 + \cdots + 4(k+1) = 2(k+1)(k+2)$

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20. Evaluate: ${}_8P_2$.

a) 28 b) 56 c) 20,160 d) 112

21. Evaluate: ${}_{12}C_5$.

a) 95,040 b) 3,991,680
c) 792 d) 5040

22. Evaluate: $\binom{n}{2}$.

a) $\frac{n!}{3!}$ b) $\frac{(n-2)!}{2!}$ c) $\frac{2!n!}{(n-2)!}$ d) $\frac{n!}{(n-2)!\,2!}$

23. *Test answers*. A true-false test contains 25 questions. How many possible completed answer sheets are there?

a) 33,554,432 b) 300
c) 625 d) 600

24. *Class Representatives*. A class has 100 members. How many different ways can it choose four representatives?

a) 3,921,225 b) 94,109,400
c) 25 d) 12,650

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25. *Menu Options*. In planning a morning reception, the host must choose two of five fruit options, three of six bagel options, and two of four muffin options. In how many way can this be done?

a) 12 b) 1200 c) 10 d) 28,800

26. Expand: $\left(x^2-1\right)^4$.

a) x^8-1
b) $x^8-4x^6+16x^4-4x^2+1$
c) $x^8-4x^6+6x^4-4x^2+1$
d) $x^8+4x^6-6x^4+4x^2-1$

27. Find the 3rd term of the binomial expansion of $(c+d)^8$.

a) $24c^6d^2$ b) $28c^6d^2$ c) $28c^4d^4$ d) $56c^4d^4$

28. Determine the number of subsets of a set containing 8 members.

a) 16 b) 128 c) 64 d) 256

29. *Card Drawing*. Suppose we draw a card from a well-shuffled deck of 52 cards. What is the probability of drawing a red king?

a) $\frac{1}{26}$ b) $\frac{2}{13}$ c) $\frac{1}{24}$ d) $\frac{1}{104}$

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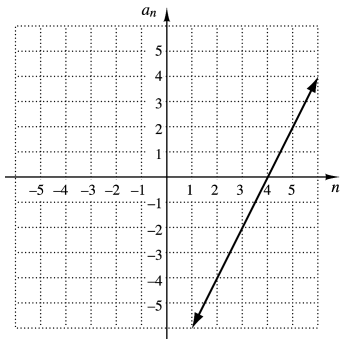
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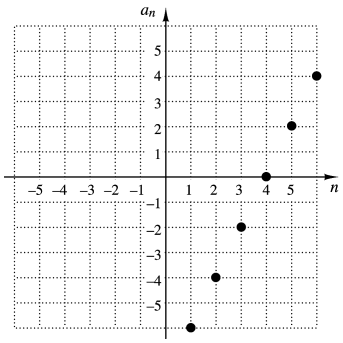
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30. The graph of the sequence whose general term is $a_n = 2n - 8$ is which of the following?

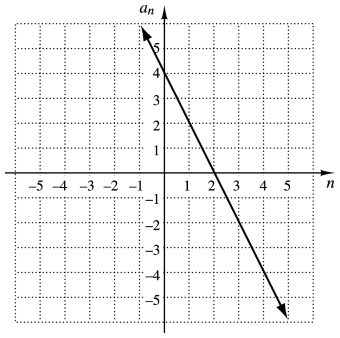
a)



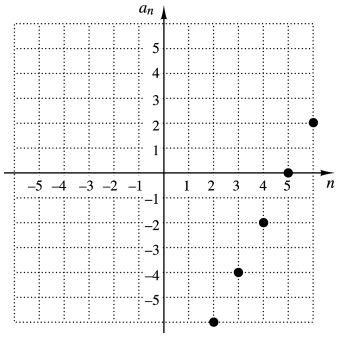
b)



c)



d)



31. Solve for n: $_nP_5 = \frac{1}{42} \cdot {}_nP_7$.

a) 10 b) 14 c) 12 d) 11

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CHAPTER 12 **NAME**_____

TEST FORM F **CLASS_____SCORE_____GRADE_____**

1. For the sequence whose nth term is $a_n = 5(2n+1)^2$, find a_6.
   a) 845 b) 65 c) 725 d) 605

2. Find and evaluate: $\sum_{k=1}^{3} \frac{k^2}{k+1}$.
   a) $\frac{9}{4}$ b) $\frac{23}{6}$ c) $\frac{181}{144}$ d) $\frac{49}{12}$

3. Find sigma notation for $3+15+75+375+1875$.
   a) $\sum_{k=1}^{\infty} 3\cdot 5^k$ b) $\sum_{k=1}^{5} 3\cdot 5^k$ c) $\sum_{k=1}^{5} 3\cdot 5^{k-1}$ d) $\sum_{k=1}^{5} 5\cdot 3^k$

4. Find sigma notation for $1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\cdots$.
   a) $\sum_{n=1}^{5} \frac{1}{n}$ b) $\sum_{n=1}^{6} \frac{1}{n-1}$ c) $\sum_{n=1}^{\infty} n$ d) $\sum_{n=1}^{\infty} \frac{1}{n}$

5. Find the 4th term of the recursively defined sequence $a_1 = 3, a_{n+1} = 2a_n - 5$.
   a) -23 b) -9 c) -11 d) 3

6. Find the 16th term of the arithmetic sequence 14, 8, 2, … .
   a) –82 b) 104 c) $\frac{38}{7}$ d) –76

7. The 1st term of an arithmetic sequence is 7 and the 20th term is -50. Find the 5th term.
   a) –8 b) –5 c) $-\frac{22}{5}$ d) $-\frac{29}{4}$

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8. Find the sum of the first 20 terms of the series $\frac{1}{3}+\frac{4}{3}+\frac{7}{3}+\cdots$.

a) $\frac{580}{3}$ b) $\frac{1180}{3}$ c) $\frac{590}{3}$ d) $\frac{640}{3}$

9. Find the sum $\sum_{k=1}^{24}(4k+8)$.

a) 104 b) 1392 c) 2784 d) 2496

10. Find the 8th term of the geometric sequence $10, 20, 40, \ldots$.

a) 1280 b) 2560 c) 5120 d) 2550

11. For a geometric sequence, $r = 3$ and $S_5 = 12.1$. Find a_1.

a) –0.5 b) –0.1 c) 0.3025 d) 0.1

12. Find the sum $\sum_{k=1}^{12} -3(2)^k$.

a) –12,285 b) –24,570 c) –12,282 d) –12,288

13. Find the sum, if it exists: $0.2+0.4+0.8+\cdots$.

a) 2 b) 10 c) 250 d) Does not exist

14. When $1.\overline{38}$ is expressed in simplified fraction notation, what is the numerator?

a) 99 b) 138 c) 137 d) 46

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15. *Loan Repayment*. A family borrows $\$20{,}000$. The loan is to be repaid in 5 yr at 8% interest, compounded annually. How much will be repaid at the end of 5 yr? Round to the nearest dollar.

a) \$29,387 b) \$41,600 c) \$21,600 d) \$29,549

16. A garden has 5 plants in the first row, 15 in the second row, 25 in the third row, 35 in the fourth row, and so on for 12 rows. How many plants are there altogether?

a) 1320 plants b) 720 plants
c) 780 plants d) 1440 plants

17. *Bouncing Ball*. A ball is dropped from a height of 256 cm and always rebounds $\frac{3}{4}$ of the distance fallen. How high does it reach the 5th time it rebounds?

a) 60.75 cm b) 45.5625 cm
c) 192 cm d) 81 cm

18. If possible, evaluate the statement:
$n^2 > (n-1)^2$, for $n = 1, 2, 3, \ldots$.

a) It is sometimes true. b) It is never true.
c) It is always true. d) It is not possible to evaluate.

19. Find and evaluate the third statement, S_3, in a mathematical induction proof of $2+5+8+\cdots+(3n-1)=\frac{n(3n+1)}{2}$, for n a natural number.

a) $2=\frac{1(3\cdot 1+1)}{2}$; True

b) $2+5+8=\frac{3(3\cdot 3+1)}{2}$; False

c) $2+5+8+\cdots+(3n-1)=\frac{n(3n+1)}{2}$; True

d) $2+5+8=\frac{3(3\cdot 3+1)}{2}$; True

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20. Evaluate: ${}_{12}P_{10}$.

a) 66 b) 239,500,800
c) 132 d) 665,280

21. Evaluate: ${}_{8}C_{3}$.

a) 336 b) 6720 c) 56 d) 120

22. Evaluate: $\binom{n}{3}$.

a) $\frac{n!}{(n-3)!\,3!}$ b) $\frac{n!}{3!}$ c) $\frac{n!}{(n-3)!}$ d) $\frac{n!\,3!}{(n-3)!}$

23. *Test answers*. A multiple choice quiz contains 12 questions, each of which may be answered a, b, or c. How many possible completed answer sheets are there?

a) 531,441 b) 1728 c) 36 d) 1320

24. *Committee Members.* A club contains 20 members. How many different committees of 3 members are possible?

a) 6840 b) 3,486,784,401
c) 8000 d) 1140

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25. *Menu Options*. In planning a banquet menu, the host must choose three of twelve appetizer options, two of five entrée options, and one of three dessert options. In how many ways can this be done?

a) 79,2300 b) 6 c) 30 d) 6600

26. Expand: $\left(x+\sqrt{3}\right)^4$.

a) x^4+9

b) $x^4+4\sqrt{3}x^3+18x^2+12\sqrt{3}x+9$

c) $x^4+12x^3+18x^2+36x+9$

d) $x^4+4\sqrt{3}x^3+48x^2+4\sqrt{3}x+9$

27. Find the 5th term of the binomial expansion of $(m+2)^5$.

a) $80m$ b) 32 c) $160m$ d) $32m$

28. Determine the number of subsets of a set containing 10 members.

a) 512 b) 100 c) 1024 d) 45

29. *Marbles*. Suppose we select, without looking, one marble from a bag containing 5 red marbles, 4 yellow marbles, and 7 blue marbles. What is the probability of selecting a red or yellow marble?

a) $\frac{9}{32}$ b) $\frac{9}{16}$ c) $\frac{5}{16}$ d) $\frac{3}{4}$

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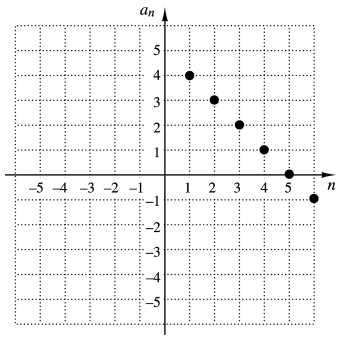
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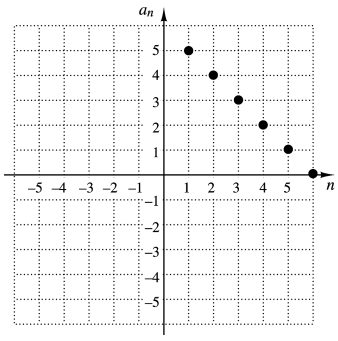
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30. The graph of the sequence whose general term is $a_n = 5 - n$ is which of the following?

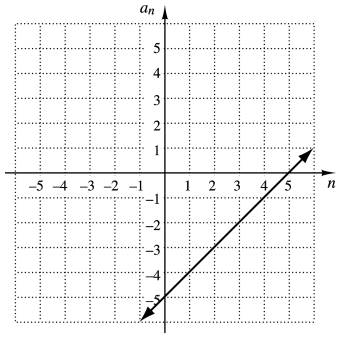
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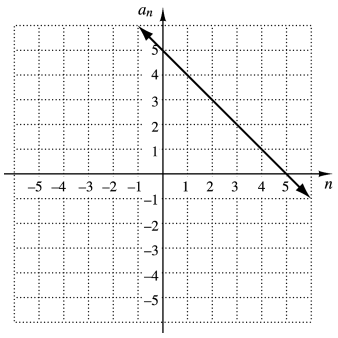
b)



c)



d)



31. Solve for n: ${}_nP_6 = 6 \cdot {}_nP_4$.

a) 7 b) 8 c) 9 d) 10

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