GHS Sorted Past Paper - MC
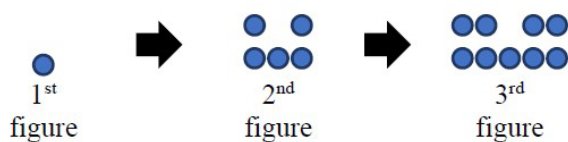# S1-03 Introduction to Algebra

1. [20 - 21 S1 Final Exam - 14] (64%)

14. There are 3 consecutive even numbers in which M is the largest. Find the sum of these three numbers.

   A. $3M - 6$
   B. $3M - 3$
   C. $3M + 6$
   D. $3M + 3$

2. [20 - 21 S1 Mid-year Exam - 05] (85%)

5. Consider the following figures.

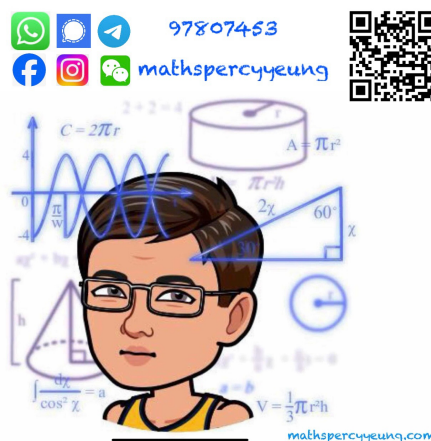According to the above pattern, find the number of dots in the 6th figure.
   A. 17
   B. 21
   C. 25
   D. 29

3. [20 - 21 S1 Mid-year Exam - 09] (51%)

9. If a_n is the nth term of a sequence and $a_n = 20 - n^2$, find $a_3 - 4a_5$.
   A. −31
   B. −9
   C. 9
   D. 31

4. [21 - 22 S1 Final Exam - 03] (80%)

3. Simplify $-3a + 7b - 3b \times 2 + 3a$.

    A. b
    B. $8b$
    C. $-6a + b$
    D. $-6a + 8b$

5. [21 - 22 S1 Final Exam - 11] (67%)

11. Consider the formula $v = ut + \frac{1}{2}at^2$. If $v = 8$, $a = 6$ and $t = -2$, find the value of u.

    A. -10
    B. -2
    C. 0.8
    D. 2

6. [21 - 22 S1 Mid-year Exam - 07] (97%)

7. It is given that $x = \frac{10}{y} - \frac{y}{3}$. Find the value of x when $y = 9$.

    A. $-\frac{17}{9}$
    B. $-\frac{9}{17}$
    C. $\frac{9}{17}$
    D. $\frac{17}{9}$

7. [21 - 22 S1 Mid-year Exam - 08] (89%)

8. Find the 7th term and 9th term of the sequence of square numbers 1, 4, 9, 16, … .

    A. 7th term = 49; 9th term = 64
    B. 7th term = 49; 9th term = 81
    C. 7th term = 56; 9th term = 64
    D. 7th term = 56; 9th term = 81

8. [21 - 22 S1 Mid-year Exam - 13] (66%)

13. Which of the following word phase represents the algebraic expression $3a^2 - b^3$?

    A. Subtract the cube of b from the square of $3a$.
    B. Subtract the square of $3a$ from the cube of b.
    C. Subtract the cube of b from the product of 3 and the square of a.
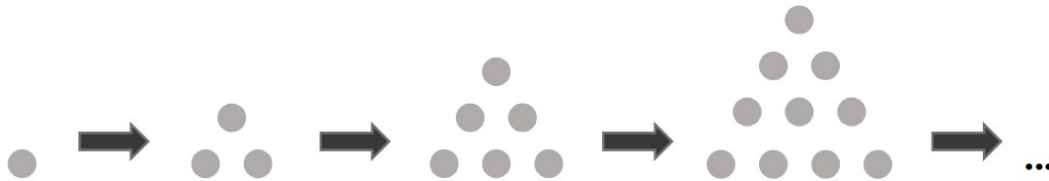   **D.** Subtract the product of 3 and the square of a from the cube of b.

9. [21 - 22 S1 Mid-year Exam - 14] (90%)

14. Find the next term of the sequence $-7, -5.5, -4, -2.5, \ldots$.

    A. -4
    B. -1.5
    C. -1
    D. 0

10. [22 - 23 S1 Final Exam - 03] (93%)

  3. In the figure, the 1st pattern consists of 1 dot. For any positive integer n, the $(n + 1)$th pattern is formed by adding $(n + 1)$ dots to the nth pattern. Find the number of dots in the 8th pattern.

    A.   36
    B.   28
    C.   21
    D.   14

11. [22 - 23 S1 Mid-year Exam - 07] (76%)

  7. Simplify $7p - 4q - 3p + 3 - q$.

    A. $4p - 3q + 3$
    B. $4p - 5q + 3$
    C. $7p - 8q - 3$
    D. $10p - 5q - 3$

12. [22 - 23 S1 Mid-year Exam - 11] (78%)

11. "Divide the sum of a and b by the product of a and c" can be expressed by the algebraic expression

　A. $a + \dfrac{b}{ac}$.

　B. $\dfrac{a}{b+ac}$.

　C. $\dfrac{ac}{a+b}$.

　D. $\dfrac{a+b}{ac}$.

13. [22 - 23 S1 Mid-year Exam - 12] (75%)

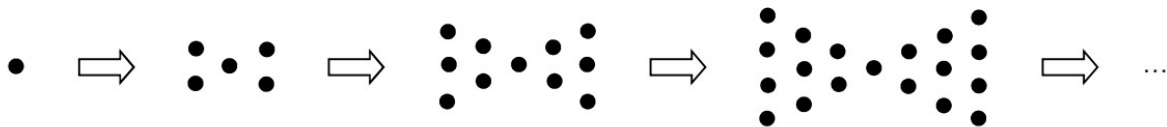**12.** $(c+c) \times (4c) + c \times (4c - c) =$

　A. $11c^2$.
　B. $12c^2 - c$.
　C. $4c^3 + 4c$.
　D. $24c^3 + 3c^2$.

14. [22 - 23 S1 Mid-year Exam - 13] (84%)

13. In the figure, the 1st pattern consists of 1 dot. For any positive integer n, the $(n + 1)$th pattern is formed by adding $(2n + 2)$ dots to the nth pattern. Find the number of dots in the 6th pattern.
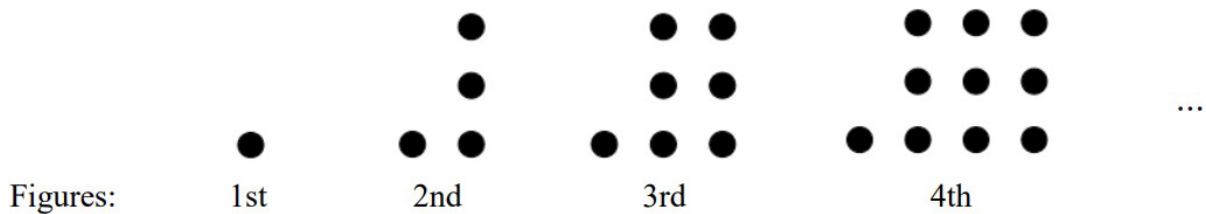

　A. 29
　B. 41
　C. 55
　D. 71

15. [23 - 24 S1 Final Exam - 01] (97%)

1. The following shows a sequence of figures formed by dots.

Figures: 1st   2nd   3rd   4th

It is given that the nth figure has $(3n-2)$ dots. Find the number of dots in the 8th figure.

    A. 19
    B. 22
    C. 24
    D. 25

16. [23 - 24 S1 Mid-year Exam - 09] (61%)

9. Which of the following pairs of expressions is NOT equal?

    A. $8c-5$ and $-5+8c$

    B. $mp \div (mn)$ and $\dfrac{p}{n}$

    C. $-b^2a^2$ and $a \cdot (-a) \cdot b \cdot b$

    D. $(-y)^2$ and $-y^2$

17. [23 - 24 S1 Mid-year Exam - 19] (70%)

19. The general term T_n of a sequence is $-2n^3$, which of the following are correct?

    I.   The 4th term of the sequence is 128.
    II.   The difference between the 1st term and the 3rd term is 52.
    III. The product of any 3 consecutive terms in this sequence must be negative.

    A. I and II only
    B. I and III only
    C. II and III only
    D. I, II and III

18. [24 - 25 S1 Final Exam - 03] (81%)

3. In the figure, the 1st pattern consists of 5 dots. For any positive integer n, the $(n+1)$th pattern is formed by adding $(2n+4)$ dots to the nth pattern.

1st   2nd   3rd
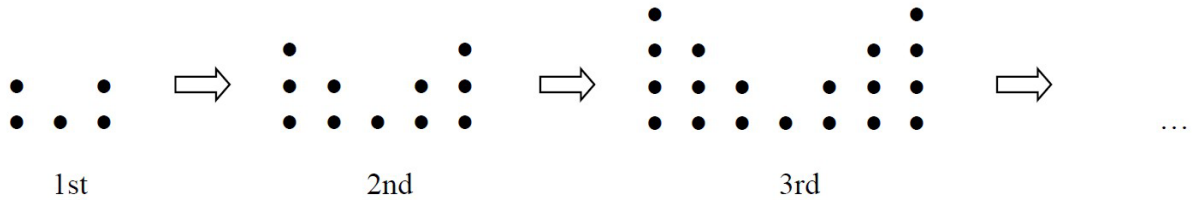
Find the number of dots in the 6th pattern.

     A.   71

     B.   55
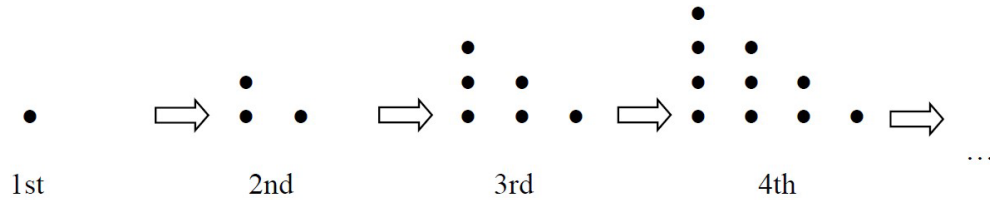
     C.   41

     D.   29

19. [24 - 25 S1 Mid-year Exam - 05] (96%)

5. What is the 6th term in the sequence which has a general term $T_n = 10 - 3n$?

     A.   –8

     B.   –5

     C.   5

     D.   8

20. [24 - 25 S1 Mid-year Exam - 06] (91%)

6. In the figure, the 1st pattern consists of 1 dot. For any positive integer n, the $(n+1)$th pattern is formed by adding $(n+1)$ dots to the nth pattern.

    1st   2nd   3rd   4th

Find the number of dots in the 7th pattern.

    A. 15

    B. 21

    C. 28

    D. 36

21. [24 - 25 S1 Mid-year Exam - 12] (92%)

12. It is given that $a > b > c > 1$. Which of the following gives the largest result?

    A. $\dfrac{ab}{c}$

    B. $\dfrac{(-a)(-b)}{-c}$

    C. ab

    D. $\dfrac{(-ab)}{c}$

22. [22 - 23 S2 Final Exam - 05] (79%)

5. Consider the formula $D = b^2 - 4ac$. Find the value of D if $a = -3$, $b = -2$ and $c = 6$.

    A. −76

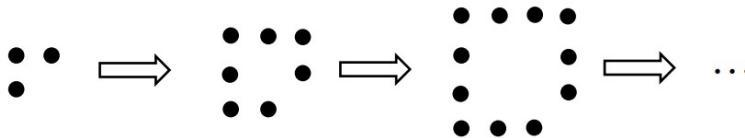   **B.** −68

    C. 68

    D. 76

23. [22 - 23 S2 Standardized Test - 03] (61%)

3. Consider the formula $s = u^2 - v^2 - r$. Find the value of r if $u = -2$, $v = -5$ and $s = 10$.

   A. -31
   B. 11
   C. 19
   D. 31

24. [22 - 23 S5 Final Exam - 15] (96%)

15. In the figure, the 1st pattern consists of 3 dots. For any positive integer n, the $(n + 1)$th pattern is formed by adding 4 dots to the nth pattern. Find the number of dots in the 8th pattern.

   A.   27
   B.   31
   C.   35
   D.   80

25. [23 - 24 S5 Mid-year Exam - 10] (73%)

10. Let a_n be the nth term of a sequence. If $a_5 = 18$, $a_7 = 47$ and $a_{n+2} = a_{n+1} + a_n$ for any positive integer n, then $a_3 =$

   A. 4.
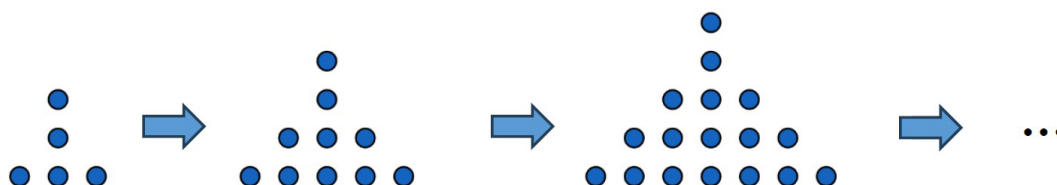   **B.** 7.
   C. 11.
   D. 29.

26. [24 - 25 S5 Final Exam - 16] (82%)

16. Let a_n be the nth term of a sequence. If $a_2 = 8$, $a_5 = 32$ and $a_{n+2} = a_{n+1} + a_n$ for any positive integer n, then $a_6 =$

   A.   12.
   B.   20.
   C.   52.
   D.   84.

27. [24 - 25 S5 Mid-year Exam - 10] (86%)

10. In the figure, the 1st pattern consists of 5 dots. For any positive integer n, the $(n+1)$th pattern is formed by adding $(2n+3)$ dots to the nth pattern. Find the number of dots in the 8th pattern.

    A.   17

    B.   65

    C.   82

    D.   95

28. [24 - 25 S6 Mock Exam - 15] (87%)

15. Let a_n be the nth term of a sequence. If $a_3 = -5$, $a_6 = -7$ and $a_{n+2} = a_n + a_{n+1}$ for any positive integer n, then $a_2 =$

    A. -9.

    B. -6.

    C. -1.

    D.   4.

GHS Sorted Past Paper - Conventional Questions
S1-03 Introduction to Algebra

1. [20 - 21 S1 Final Exam - 04]

4. Simplify $12a - 4b \div 2 - 8 \times 2a + 3b$. **(2 marks)**

2. [20 - 21 S1 Final Exam - 16]

16. The general term of a sequence is $a_n = \dfrac{3n+k}{n}$. If the 4th term of the sequence is 2, find the value

of k. **(2 marks)**

3. [20 - 21 S1 Mid-year Exam - 09] (66%)

9. The general term of a sequence is $a_n = 7n + 6$. The kth term of the sequence is 90. Find the value
of k. **(2 marks)**

4. [21 - 22 S1 Mid-year Exam - 02] (75%)

2. (a) Simplify $7a + 1 - 3a + a$. **(1 mark)**
(b) Simplify $3k - 16h \div 4 - 4k \times 2 + 5h$. **(2 marks)**

5. [21 - 22 S1 Mid-year Exam - 05] (60%)

5. It is given that $a = \dfrac{b^2 - c}{3}$. Find the value of a if $b = -4$ and $c = -3$. **(2 marks)**

6. [21 - 22 S1 Mid-year Exam - 06] (89%)

6. The general term of a sequence is $a_n = (-1)^n$. Find a_1, a_2 and a_3. **(3 marks)**

7. [21 - 22 S1 Mid-year Exam - 12] (70%)

12. In a test, 3 marks will be awarded for each correct answer but 1 mark will be deducted for each wrong answer. Mary attempted all questions and her total mark was Z. The number of correct and wrong answers she obtained were x and y respectively.

    (a) Write down a formula for Mary's total mark. **(1 mark)**

    (b) It is given that Mary answered 13 questions wrongly and her total mark was 62. Find the number of correct answers she had. **(2 marks)**

8. [22 - 23 S1 Final Exam - 06] (71%)

6. Consider the formula $X = \dfrac{p^2 + q^2}{pq}$. If $p = 4$ and $q = -2$, find X. **(2 marks)**

9. [22 - 23 S1 Mid-year Exam - 03] (79%)

3. It is given that the general term a_n of a sequence is $2n^2 - 5n$. Find a_4 and a_6. **(2 marks)**

10. [22 - 23 S1 Mid-year Exam - 04] (90%)

4. The weight of a bag is 3 kg and the weight of a box is 7 kg. There are x bags and y boxes in a room.

    (a) Write down the formula for the total weight of the bags and boxes (W kg) in the room. **(1 mark)**

    (b) Suppose there are 8 bags and 5 boxes in the room. Find the total weight of the bags and boxes. **(2 marks)**

11. [23 - 24 S1 Final Exam - 02] (66%)

2. Consider the formula $P = \dfrac{a^2 - b^2}{2(a-1)b}$. Find the value of P when $a = 6$ and $b = -1$. **(2 marks)**

12. [23 - 24 S1 Mid-year Exam - 01] (65%)

1. Represent 'subtract the product of y and 4 from the cube of x' by an algebraic expression. **(1 mark)**

13. [23 - 24 S1 Mid-year Exam - 06] (78%)

6. Consider the formula $K = ab - c^2$. If $a = 3.5$, $b = -2$ and $c = -1$, find the value of K. **(2 marks)**

14. [23 - 24 S1 Mid-year Exam - 14] (55%)

14. 200 visitors entered a carnival on 1st December 2022. With a successful promotion scheme, the number of visitors was increased by 10 every day in December.

(a) Write down the number of visitors of the carnival on the last day of December. **(1 mark)**

(b) The daily income (I) of a food stall in the carnival can be calculated by the formula:
$$I = 20f + 0.5n,$$
where f is the number of fish ball sticks sold and n is the number of visitors entered the carnival. On the last day of December in 2022, the number of fish ball sticks sold is the smallest 3-digit prime number. The manager of the food stall claims that the daily income on the last day of December exceeds $2300. Do you agree with the claim? Explain your answer.

(4 marks)

15. [24 - 25 S1 Final Exam - 09] (72%)

9. Consider the formula $C = \dfrac{a^2}{2} - b^3$. If $a = -2$ and $b = -3$, find the value of C by the method of substitution. **(2 marks)**

16. [24 - 25 S1 Mid-year Exam - 04] (98%)

4. Represent "Add 5 to the product of x and y." by algebraic expression. _____ **(1 mark)**

17. [24 - 25 S1 Mid-year Exam - 11] (76%)

11. Consider the formula $m = \dfrac{n^2 - 6p}{n}$. If $n = -2$ and $p = -4$, find the value of m.

(2 marks)

18. [24 - 25 S1 Mid-year Exam - 16] (23%)

16. Let a_n be the nth term of a sequence and $a_3 = 10$. For any positive integer n, the $(n + 1)$th term is formed by adding 3 to the nth term.

(a) Find a_{21}. **(2 marks)**

(b) A sequence of trapeziums and parallelograms are formed as shown in **Figure 1**. T_n is the nth trapezium and P_n is the nth parallelogram.
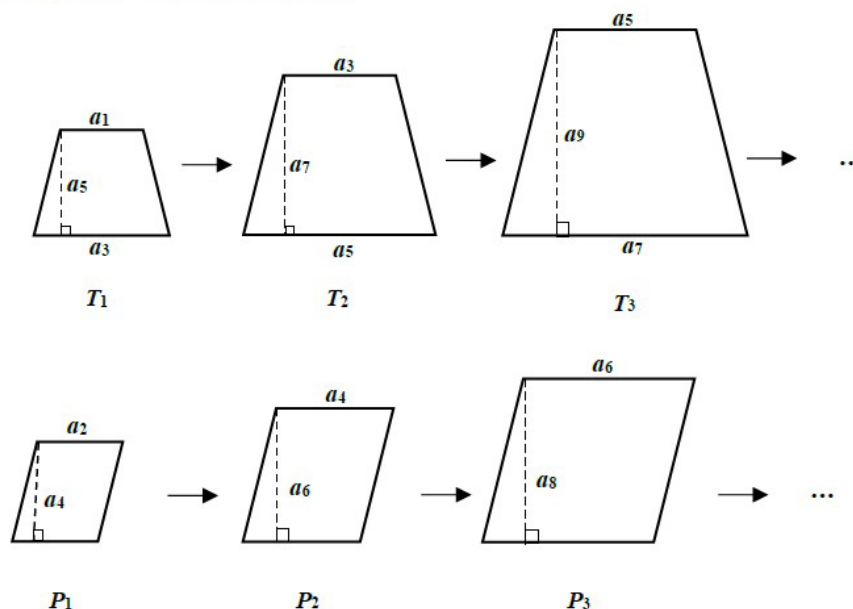

Figure 1

Someone claims that the area of T_{10} is greater than the area of P_{10} by at least 180. Do you agree? Explain your answer. **(4 marks)**

19. [21 - 22 S1 Final Exam - 05] (76%)

5. In **Figure 1**, the lengths of AB, BC and CA of $\triangle ABC$ are $2a - 5$, $a + b$ and $2 - 3b$ respectively.
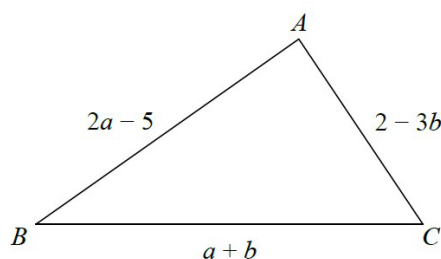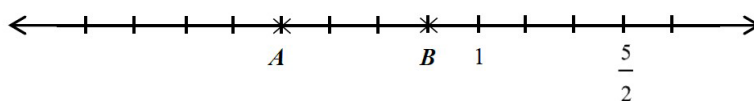

Figure 1

(a) Express the perimeter of $\triangle ABC$ in terms of a and b. **(1 mark)**

(b) Find the perimeter of $\triangle ABC$ if $a = 8$ and $b = -3$. **(2 marks)**

20. [24 - 25 S1 Mid-year Exam - 05] (82%)

5. Consider the following number line.

$$A \qquad B \quad 1 \qquad \frac{5}{2}$$

   (a) Write down the directed numbers represented by A and B.

   $A =$ _____ $\qquad\qquad$ $B =$ _____ $\qquad\qquad$ **(2 marks)**

   (b) Find the value of $3A + 2B$. $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ **(2 marks)**

21. [21 - 22 S1 Mid-year Exam - 13] (33%)

13. Samantha got a raffle ticket and the two sides of it are shown below. She could have a prize if the ticket number is a multiple of 4. Could she get the prize? Explain your answer. **(4 marks)**

Raffle Ticket 2021
No: *387B65BB*

Let HOPE be the ANCHOR of our lives

Checking Instruction

A number can be found by subtracting the sum of y and the square of x from z. It is given that z is the number of days in the year 2021, y is the number of days in February of 2021 and x is the largest negative integer. **B** is the last digit of this number.