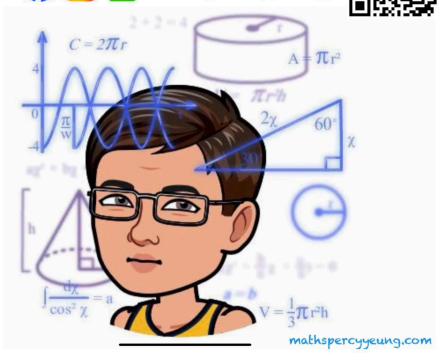



# 2024 - 2025 First Term Examination
# Revision
# S.3 Mathematics

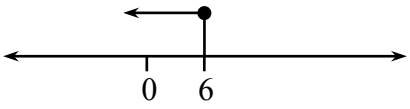
S.3_____

Name:_____(  )

**Section A  Short Questions  (16 marks)**

Put ALL your answers in the spaces provided. Working steps are not required.

| | |
|---|---|
| 1. Factorize $6a^2-9a^3b$ . | 1. |
| 2. Factorize $4a^2-b^2$ . | 2. |
| 3. Factorize $x^2-9xy-90y^2$ . | 3. |
| 4. Simplify $(-x)^{10}$ . | 4. |
| 5. Simplify $(3a^5b)^3$ . | 5. |
| 6. Simplify $\left(\frac{a^{123}b^{456}}{a^{789}b^{123}}\right)^0$ . | 6. |
| 7. Express the following values in scientific notation.<br>(a) 0.00321<br>(b) $1.1\times10^{2024}+9.5\times10^{2023}$ | 7.<br>(a)<br>(b) |

| | | |
|---|---|---|
| 8. The total consumption of drinking water in city $A$ last year is $57\,284\,300\,000\ \text{m}^3$. If there are $365$ days last year, express the average daily consumption of drinking water in city $A$ in scientific notation.<br>(Give your answer correct to 3 significant figures.) | 8. | |
| 9. Express $1011_2$ in expanded form with base $2$. | 9. | |
| 10. Write down the inequality in $x$ whose solution is represented by the diagram below:<br>  <br> | 10. | |
| 11. Fill in the blanks with "$>$" or "$<$".<br>$-5.5$ ____ $-5$ | 11. | |
| 12. Solve the inequality $-2x > 8$. | 12. | |
| 13. Suppose the height of a tree is $h$ cm. It is known that the height of the tree is at least $180$ cm. Write an inequality for $h$. | 13. | |
| 14. $x$ is decreased by $10\%$ and it becomes $99$. Find the value of $x$. | 14. | |
| 15. Cindy deposited $\$1\,000$ in a bank at an interest rate of $10\%$ p.a. compounded yearly. Find the amount she will get after $3$ years. | 15. | |

**Section B Conventional Questions (50 marks)** (a) Factorize $-b^2+8(5-b)-20$ . (2 marks)

(b) Factorize $b^2+20b+100$ . (1 mark)

(c) Using (a) and (b), simplify $\dfrac{-b^2+8(5-b)-20}{b^2+20b+100}$ . (2 marks)

16. Convert the denary number 100 into a binary number **using short division**. (2 marks)

17. Simplify the following expressions, and express your answers with positive indices.

(a) $x^{-2} \times x^{-3}$ (2 marks)

(b) $\dfrac{x^5 y^2}{(-2x^3 y)^3}$ (3 marks)

(c) $\left(\dfrac{a^2 b^6}{2a^5}\right)^2 \div \left(\dfrac{a^{-3}}{2b^8}\right)^{-2}$ (2 marks)

18. Solve the inequality $2(15-2x) \geq 5(3x+25)$ and represent the solutions graphically. (3 marks)

19. (a) Solve the inequality $\frac{1}{2}-\frac{5x+11}{9}<\frac{7(2-x)}{6}$. (3 marks)

(b) Write down the greatest odd number that satisfy the inequality in (a). (1 mark)

20. The sum of two consecutive odd number is not more than $999$. By setting up an inequality, find the greatest possible value of the larger number. (3 marks)

21. Each cake $A$ sold in a cake shop makes $\$5$ profit. Each cake $B$ sold in the cake shop makes $\$7$ profit. If $88$ cakes are sold and the total profit made is greater than $\$550$, find the maximum number of cakes $A$ sold. (3 marks)

22. Last year, the number of female students in a school was $400$. The number of male students was $25\%$ more than that of the females. This year the number of female students decreases by $20\%$ but the total number of students does not change. Find the percentage change of the number of male students. (3 marks)

23. A wallet is sold at a discount of $25\%$ on its marked price. The selling price of the wallet is $\$690$.

(a) Find the marked price of the wallet.

(b) After selling the wallet, the percentage profit is $15\%$. Find the cost of the wallet.

(4 marks)

24. The population of a city grows at a constant rate of $r\%$ per year. Given that the population of the city in $2010$ and $2012$ were $165\,000$ and $206\,976$ respectively.

(a) Find the value of $r$. (2 marks)

(b) Find the population of the city in $1999$. (2 marks)

(Give your answers correct to the nearest integer.)

25. Mrs. Chan wants to deposit $ 250 000 in a bank for 4 years. She has two banks to choose.

Bank A: Interest rate of 6% p.a. by simple interest

Bank B: Interest rate of 5.9% p.a. compounded quarterly.

Which bank should she choose? Explain your answer briefly.

(4 marks)

26. The salaries tax rates are as shown in the following table:

| Net chargeable income | Rate |
|---|---|
| On the first $ 50 000 | 2% |
| On the next $ 50 000 | 6% |
| On the next $ 50 000 | 10% |
| On the next $ 50 000 | 14% |
| Remainder | 17% |

Mr. Ng's annual income is $1 000 000 and his allowance is $100 000, how much salaries tax should he pay? (3 marks)

**Section C Bonus Questions (11 marks)**

27. Factorize $4-a^2-b^2-2ab$ . (1 mark)

28. Factorize $9+x^3-9x-x^2$ . (1 mark)

29. Simplify $\frac{15}{2x^2-x-3}-\frac{16x}{4x^2-4x-3}$ . (2 marks)

30. Solve the equation $5^{n+2} - 5^{n+1} + 5^n = 105 \times 5^7$ . (1 mark)

31. Arrange $3^{-420}$, $9^{-200}$, $27^{-150}$ and $243^{-85}$ in descending order. (1 mark)

32. Solve the inequality $\frac{2x+9}{4}+\frac{5x-3}{-8}<\frac{-4x+7}{-3}$ . (1 mark)

33. The salaries tax rates are as shown in the following table:

| Net chargeable income | Rate |
|---|---|
| On the first $45 000 | 2% |
| On the next $45 000 | 7% |
| On the next $45 000 | 12% |
| Remainder | 17% |

Roy pays $49 740 as his salary tax. It is known that Roy has a total allowance of $132 000.

Find the annual income of Roy. (2 marks)

34. (a) Simplify $\dfrac{x^{-1}y^{-2}-x^{-2}y^{-1}}{x^{-2}y^{-2}}$ .

(b) Hence, simplify and expand $\left(\dfrac{x^{-1}y^{-2}-x^{-2}y^{-1}}{x^{-2}y^{-2}}\right)\cdot\dfrac{1}{(x+y)^{-1}}$ .

(2 marks)

**2023 – 2024**
**First Term Examination**
**S.3 Mathematics Paper 2**

S.3_____ (  )  Full Marks: 20 marks

Name:_____  Time Allowed: 30 min

**INSTRUCTIONS**

1. Write your name, class and class number in the spaces provided on both the question paper and the Multiple-Choice Answer Sheet.
2. This paper consists of 20 multiple choice questions.
3. All questions carry equal marks.
4. **ANSWER ALL QUESTIONS**. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly, otherwise you will lose marks if the answers cannot be captured.
5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.
6. No marks will be deducted for wrong answers.
7. The diagrams in this paper are not necessarily drawn to scale.
8. Only calculators with the "**H.K.E.A. APPROVED**" or "**H.K.E.A.A. APPROVED**" label are allowed in the examination.

1. Factorize $-6n+9n^2-8$.

   A. $(3n-2)(3n+4)$

   B. $(3n+2)(3n-4)$

   C. $(n-2)(9n+4)$

   D. $(n+2)(9n-4)$

2. Factorize $2h^2-10hk+12k^2$.

   A. $(h-3k)(h-2k)$

   B. $(h-3k)(h+2k)$

   C. $2(h-3k)(h-2k)$

   D. $2(h-3k)(h+2k)$

3. Factorize $2a^2-45b+10a-9ab$.

   A. $(a+5)(2a+9b)$

   B. $(a-5)(2a+9b)$

   C. $(a+5)(2a-9b)$

   D. $(a-5)(2a-9b)$

**2023 – 2024**
**First Term Examination**
**S.3 Mathematics Paper 2**

Name:_____ S.3_____ (  )

4. Simplify $\frac{a^7}{(a^{-2}b^4)^{-3}}$.

   A. $ab^{12}$

   B. $a^5b^{12}$

   C. $\frac{a^{12}}{b}$

   D. $a^9b^{12}$

5. The length of the longest bridge in the world is about 61 530 000 cm. Express the length in m. (Give your answer in scientific notation).

   A. $6.153\times10^4$ m

   B. $61.53\times10^4$ m

   C. $6.153\times10^5$ m

   D. $61.53\times10^5$ m

6. The present price of a photocopier is $1 458. If it depreciates at a constant rate of 10% per year, find the price of the photocopier 3 years ago.

   A. $1 095

   B. $2 000

   C. $2 500

   D. $2 662

7. Jenny deposits \$7 500 in a bank at 6% p.a. compounded half-yearly. Find the amount she will receive after 5 years, correct to the nearest \$0.1.

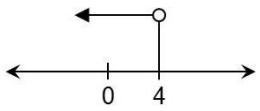
A. \$2579.3

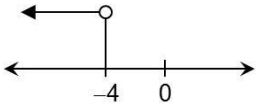
B. \$9750

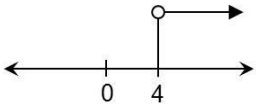
C. \$10 036.7

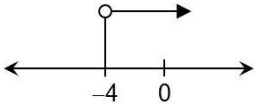
D. \$10 079.4

8. Which of the following diagrams represents the solutions of $\frac{1+5x}{7} < 3$?

A.



B.



C.



D.



9. $\frac{(9^n)(3^{3n})}{81^{2n}} =$

A. $3^n$ .

B. $3^{3n.}$ .

C. $3^{-n}$.

D. $3^{-3n}$.

**2023 – 2024**
**First Term Examination**
**S.3 Mathematics Paper 2**

Name:_____ S.3_____ (  )

10. The smallest integer that satisfies the inequality $3-\frac{2-x}{4}>\frac{7}{2}$ is

A. 4 .

B. 5 .

C. 6 .

D. 7 .

11. $10110000001101_2$ =

A. $11\times2^{10}+13$ .

B. $11\times2^{10}+26$.

C. $11\times2^{11}+13$ .

D. $11\times2^{11}+26$.

12. If $ax - b$ is the common factor of $2x^2 + 5x - 3$ and $6x^2 + 5x - 4$, find the value of $a + b$.

A. $-1$

B. 1

C. 2

D. 3

13. Refer to the progressive tax rates as shown below.

| **Net chargeable income** | **Tax rate** |
|---|---|
| On the first \$50 000 | 2% |
| On the next \$50 000 | 6% |
| On the next \$50 000 | 10% |
| On the next \$50 000 | 14% |
| Remainder | 17% |

Clara's monthly income is \$23 000. If her allowance is \$192 000, how much salaries tax should she pay?

A. \$1 680

B. \$2 040

C. \$3 040

D. \$5 040

14. Factorize $4(x-7)^2-5(x-7)-6$.

A. $(x+2)(4x-3)$

B. $(x-2)(4x+3)$

C. $(x-5)(4x+31)$

D. $(x-9)(4x-25)$

Name:_____ S.3_____ (  )

15. Write the denary number $2^9 + 2^6 + 5 \times 2^3$ as a binary number.

    A. $100110010_2$

    B. $100110100_2$

    C. $1001100100_2$

    D. $1001101000_2$

16. Mrs Wong spends \$200 to buy 4 soaps and 7 bottles of shampoo. It is given that the price of a bottle of shampoo is 3 times that of a soap and the price of a soap is \$$x$. Which of the following inequalities can be used to find the range of values of $x$?

    A. $4x + 7(3x) \leq 200$

    B. $4x + 7(3x) < 200$

    C. $4(3x) + 7x \leq 200$

    D. $4(3x) + 7x < 200$

17. When a number is first increased by 25% and then decreased by $r$%, it remains unchanged. What is the value of $r$?

    A. 20

    B. 25

    C. 75

    D. 80

18. The height of a trapezium is 5 cm. The upper base of the trapezium is 4 cm shorter than its lower base. If the area of the trapezium is at most 50 $cm^2$, the maximum length of the upper base of the trapezium is

A. 7 cm.

B. 8 cm.

C. 9 cm.

D. 10 cm.

19. A principal of $70 000 is deposited at an interest rate of 6% p.a. for 4 years. What is the difference between the simple interest and the compound interest compounded quarterly? (Give your answer correct to the nearest integer.)

A. $1 573

B. $1 874

C. $2 029

D. $2 134

20. In a race, Lily's running speed is 10 km/h and Athena's running speed is 15 km/h. Athena finishes the race earlier than Lily by at least 45 minutes. Find the minimum distance of the race.

A. 22 km

B. 22.5 km

C. 23 km

D. 23.5 km

End of paper