2024-2025 中三
上學期考試
數學

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數學

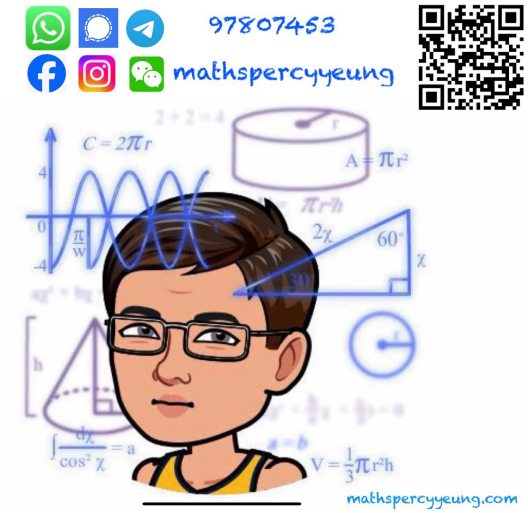
試題答題簿

本試卷中文試題必須用中文作答

英文試題必須用英文作答

二零二五年一月六日
一小時三十分鐘完卷

(上午八時十五分至上午九時四十五分)



部 份	分 數
甲部	/30
乙（31 – 33）	
乙（34 – 40）	
乙部	/40
丙部	/30
全卷	/100

考生須知

(一) 宣布開考後，考生須首先在第 1 頁的適當位置填寫學生姓名、班別及學號。

(二) 本試卷**各題均須作答**，答案須寫在本試題答題簿中預留空位內。

(三) 除特別指明外，須詳細列出所有算式。數值答案須用真確值，或準確至三位有效數字的近似值表示。

(四) 本試卷的附圖不一定依比例繪成。

甲部 (30 分)

本部各題全答，選擇最佳答案並須寫在多項選擇題答題紙上。

1. Solve the equation $\frac{-x+8}{3}=5+2x$.

   A. $x=-4.6$

   B. $x=-\frac{7}{3}$

   C. $x=-1$

   D. $x=0$

2. A robot is sold for \$15 000 at a profit of 60%. The cost price of the robot is

   A. \$9 000 .

   B. \$9 375 .

   C. \$24 000 .

   D. \$25 000 .

3. The volume of perfume in a bottle is measured as 48.2 mL correct to the nearest 0.2 mL. Which of the following can be the actual volume of the perfume in the bottle?

   A. 48.05 mL

   B. 48.12 mL

   C. 48.3 mL

   D. 48.31 mL

4. $(a-2b)(3a+4b)-(3a+4b)^2=$

   A. $2(3a+4b)(a-3b)$.

   B. $-2(3a+4b)(a-3b)$.

   C. $-2(3a+4b)(3a-b)$.

   D. $-2(3a+4b)(a+3b)$.

5. If $h(h+k)=k(1+h)$, then $k=$

   A. h .

   B. $2h$.

   C. h^2 .

   D. $\frac{h^2-h}{2}$.

6. $16a^2-(3b-4c)^2=$

   A. $(4a+3b-4c)(4a-3b+4c)$.

   B. $(4a+3b+4c)(4a-3b+4c)$.

   C. $(4a-3b-4c)(4a-3b+4c)$.

   D. $(4a+3b-4c)(4a+3b+4c)$.

7. $64^{111}\times 7^{333}=$

   A. 28^{333} .

   B. 28^{444} .

   C. 448^{333} .

   D. 448^{444} .

8. $10101000000101_2=$

   A. $21\times 2^9+5$.

   B. $21\times 2^9+10$.

   C. $21\times 2^{10}+5$.

   D. $21\times 2^{10}+10$.

9. 下列哪個代數式相等於 $-(3x)^4$ ？

   A. $3x^4$

   B. $-3x^4$

   C. $81x^4$

   D. $-81x^4$

10. $-4.326\times 10^{-5}=$

    A. –0.000 043 26 .

    B. –0.000 004 326 .

    C. 43 260 .

    D. 432 600 .

11. $\frac{125^{2k+1}}{25^{3k+1}}=$

    A. 1 .

    B. 5 .

    C. 5^k .

    D. 5^{-k} .

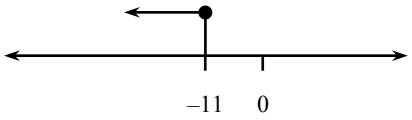
12. 下列何者的其中一個因式是 $x-2$？

A. x^2+4
B. $-x^2-4x-4$
C. $2x^2-4x$
D. $4x^2-4$

13. 一個芒果的售價是 $\$x$。一個橙的售價是一個芒果的售價的一半。若 4 個芒果和 5 個橙的總售價小於 \$78，下列哪個不等式可用來求 x 值的範圍？

A. $4x+5\left(\frac{x}{2}\right)>78$
B. $4x+5\left(\frac{x}{2}\right)<78$
C. $4x+5(2x)>78$
D. $4x+5(2x)<78$

14. 圖中所示為一個以 x 為未知數的不等式的解的圖示。



下列哪個（些）是該不等式的解？

I. $x=-8$
II. $x=-11$
III. $x=-15$

A. 只有 I
B. 只有 II
C. 只有 III
D. 只有 II 和 III

15. 若 $a>b>0$ 和 $k<0$，下列何者必為正確？

I. $a^2<ab$
II. $ak<bk$
III. $\frac{a}{k^2}>\frac{b}{k^2}$

A. 只有 I
B. 只有 II
C. 只有 I 和 III
D. 只有 II 和 III

16. 有多少個負整數滿足不等式 $30-25x<21x+98$？

A. 0
B. 1
C. 2
D. 3

17. If the price of a car is decreased by 40% and then increased by 35%, find the overall percentage change in the price of the car.

A. +89%
B. –9%
C. –19%
D. –86%

18. Carol deposits \$37 000 in a bank at a simple interest rate of 4% per annum. What is the amount that she will get after 18 months?

A. \$2 220
B. \$37 222
C. \$38 480
D. \$39 220

19. Eddie sells two cars for \$240 000 each. He gains 25% on one and loses 25% on the other. After the two transactions, Eddie

A. loses \$32 000.

B. gains \$20 000.

C. gains \$24 000.

D. has no gain and no loss.

20. The rainfalls in a city in 2017 and 2020 were 8000 mm and 6859 mm respectively. If the rainfall in the city decreases by r% per year, find r.

A. 4.7

B. 5

C. 6

D. 14.2

21. Refer to the progressive salaries 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%

If Winnie paid \$28 410 as salaries tax, find her net chargeable income.

A. \$73 000

B. \$140 920

C. \$273 000

D. \$340 920

22. \$$P$ is invested at r% per annum, compounded half-yearly. The interest received after n years is

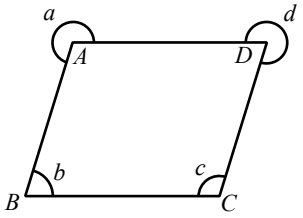
A. $\$\left[P\left(1+\frac{r\%}{2}\right)^{n}-P\right]$.

B. $\$P\left(1+\frac{r\%}{2}\right)^{n}$.

C. $\$\left[P\left(1+\frac{r\%}{2}\right)^{2n}-P\right]$.

D. $\$P\left(1+\frac{r\%}{2}\right)^{2n}$.

23. In the figure, $ABCD$ is a parallelogram.



Which of the following must be true?

I. $a + c = 360°$

II. $b + c = 180°$

III. $a + d = 540°$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

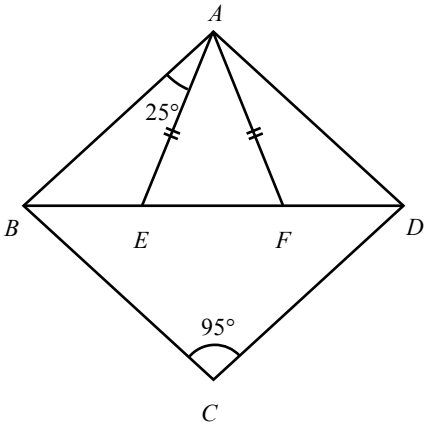
24. In the figure, $ABCD$ is a rhombus. E and F are points on BD such that $AE = AF$, $\angle BAE = 25°$ and $\angle BCD = 95°$. Find $\angle EAF$.

A. 42.5°

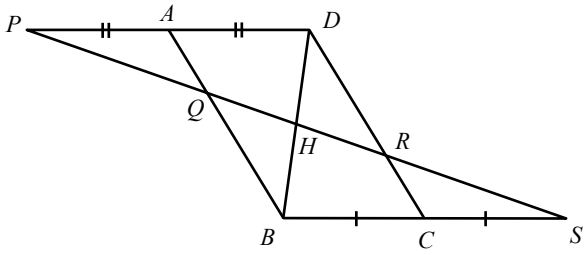
B. 45°

C. 50°

D. 85°



25. In the figure, $ABCD$ is a parallelogram. PAD and BCS are straight lines. AB, DB and DC intersect PS at Q, H and R respectively. $PA = AD$ and $BC = CS$.



Which of the following must be true?

I. $PQ = QR = RS$

II. $BH = DH$

III. $BH \perp QR$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

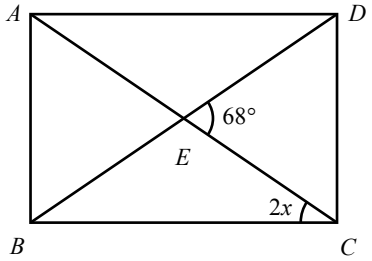
26. In the figure, $ABCD$ is a rectangle. AC and BD intersect at E. $\angle CED = 68°$. Find x.

A. 56°

B. 34°

C. 28°

D. 17°



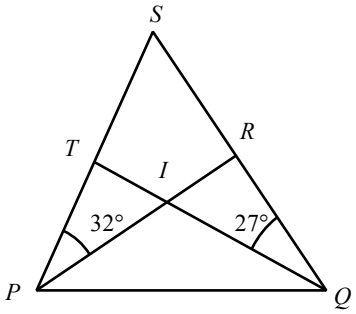
27. In the figure, I is the in-centre of ΔPQS. It is given that $\angle RPS = 32°$ and $\angle TQS = 27°$. Find $\angle PRS$.

A. 82°

B. 84°

C. 86°

D. 88°



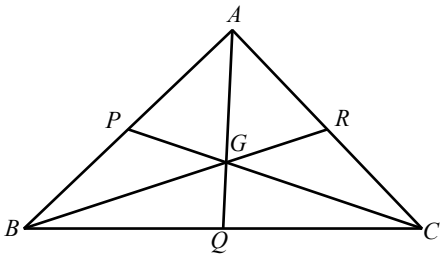
28. In the figure, G is the centroid of ΔABC. AG, BG and CG are produced to meet BC, AC, and AB at Q, R and P respectively. It is given that $AP = 21$ cm, $CQ = 29$ cm and $CR = 20$ cm. Find the area of ΔABC.

A. 760 cm^2

B. 800 cm^2

C. 840 cm^2

D. 880 cm^2



29. In the figure, AC and BD intersect at E. AC is the perpendicular bisector of BD. Which of the following must be true?

I. $BE = DE$

II. $AB = AD$

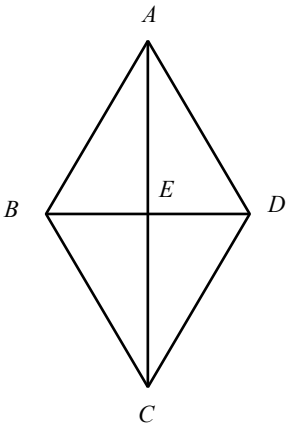
III. $AE = EC$

A. I and II only

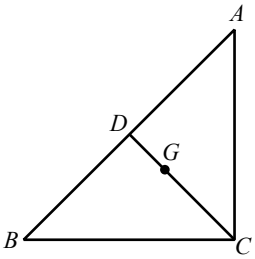
B. I and III only

C. II and III only

D. I, II and III



30. In the figure, D is a point on AB such that the centroid G of ΔABC lies on CD.



Which of the following must be true?

A. CD is the angle bisector of $\angle ACB$.

B. CD is the perpendicular bisector of AB.

C. CD is an altitude of ΔABC.

D. $AD = BD$

乙部 (40 分)

31. The cost price of a game console is $1250. The game console is sold at a profit of 28%.
    (a) Find the selling price of the game console.
    (b) If the game console is sold at a discount of 20% on its marked price, find the marked price of the game console.

(4 marks)

32. 因式分解
    (a) $4x^3 - 20x^2y$ ，
    (b) $4x^3 - 20x^2y - xy^2 + 5y^3$ 。

(4 分)

33. 化簡 $\frac{1}{4m+5}-\frac{1}{5-4m}$ 。 (3 分)

34. 化簡 $\left(\frac{x^{-6}y^{0}}{3x^{2}y^{-5}}\right)^{3}$，並以正指數表示答案。 (3 分)

35. 若 n 為一正整數，化簡 $\frac{6^{n}-2^{n}}{2^{n}}$ 。 (3 分)

36. 已知一個碳原子的重量是1.993×10^{-23}克，而一個氫原子的重量是1.673×10^{-24}克。一個甲烷分子由一個碳原子和四個氫原子組成。

(a) 以科學記數法表示一個甲烷分子的重量。

(b) 在一公斤甲烷中有多少個甲烷分子？

（以科學記數法表示，並將答案準確至 2 位有效數字。）

(4 分)

37. 解不等式 $\frac{8-7x}{5} \le \frac{6-4x}{3}$，並在數線上表示它的解。 (4 分)

38. 兩個連續整數之和不大於 130。設 x 為較小整數。

(a) 設立以 x 為變量的不等式。

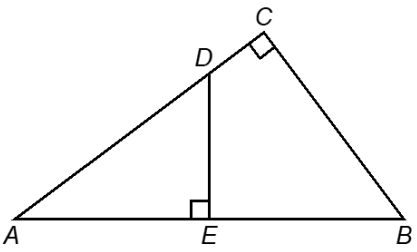
(b) 從解(a)的不等式，求這兩個整數的最大可能值。

(5 分)

39. Jackie wants to borrow \$720 000 from a bank for 10 years. Bank A offers an interest rate of 6% per annum, compounded monthly. Bank B offers an interest rate of 6.2% per annum, compounded half-yearly. Which bank should he choose in order to pay less interest? Explain your answer. (5 marks)

40. In the figure, AEB and ADC are straight lines. $AC \perp BC$, $DE \perp AB$, $BC = 24$, $AD = 25$ and $CD = 7$.
    (a) Prove that $\Delta ADE \sim \Delta ABC$.
    (b) Prove that DE is the perpendicular bisector of AB.

(5 marks)



丙部 (30 分)

41. There are some red balls, green balls and blue balls in a box. The ratio of the numbers of red, green and blue balls is 3 : 4 : 5. Suppose that the numbers of red balls and green balls increase by 15% and 20% respectively and the total number of balls in the box remains unchanged.

    (a) Find the percentage change in the number of blue balls. (4 marks)

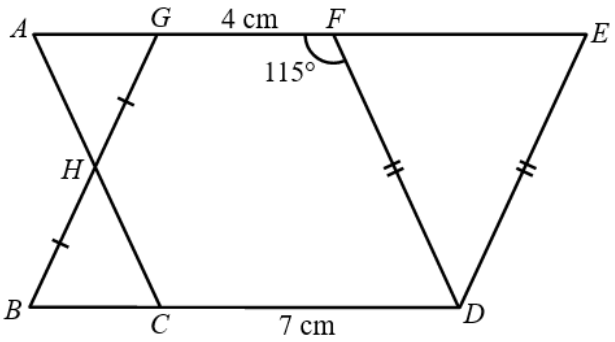
    (b) If the number of green balls is increased by 16, find the final number of blue balls in the box. (3 marks)

    (c) The cost of each ball in the box is \$2. Finally each red ball and green ball were sold at \$3 and \$4.5 respectively and the percentage profit of selling all balls is 55%. Find the selling price of each blue ball. (3 marks)

42. In the figure, $ACDF$ and $BDEG$ are parallelograms. $AGFE$ and BCD are straight lines. AC and BG intersect at H. $BH = HG$, $DE = DF$, $GF = 4$ cm, $CD = 7$ cm and $\angle GFD = 115°$.

(a) Find $\angle HBC$. (4 marks)

(b) Find the length of EF. (6 marks)



43. (a) 因式分解

(i) $2x^2 - 9x + 9$，

(ii) $6x^2 + 23x - 48$。

(2 分)

(b) 承上題，因式分解 $2x^3 - 15x^2 - 14x + 48$。 (4 分)

(c) 大雄宣稱 $x + 2$ 必定為 $2x^3 - 14x^2 - 12x + 48$ 的其中一個因式，你同意嗎？試解釋你的答案。 (4 分)

試 卷 完