



MathConceptition

2023

P6

Question Booklet

問題簿

Time: 50 Minutes

Calculators are NOT permitted.

Instructions:

1. **DO NOT OPEN THIS QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.**
2. **If the information printed on your answer sheet is not correct, please inform the invigilator immediately.**
3. **Please use a pencil and write your answers neatly ONLY on the answer sheet provided. DO NOT write or draw in the circle next to each answer box. No mark will be given if you failed to follow this instruction.**
4. **Unless otherwise specified, all answers must be in exact value and in its simplest form. Writing the units for the answers is NOT necessary.**
5. **Rough-work sheets provided will be collected at the end of the contest but they will not be marked.**
6. **Diagrams in this question booklet are not necessarily drawn to scale.**

限時：50 分鐘

不允許使用計算機。

比賽須知：

1. **未宣布開始前，切勿翻閱此問題簿。**
2. **請核對答題紙上列出的資料是否與你相符。如有問題，請舉手。**
3. **所有答案必須寫在答題紙內，並須用鉛筆作答。請勿填寫或畫花題號後方的圓圈，否則該題答案將會作廢。**
4. **除非題目特別表明，所有答案均不需填寫單位，但必須以準確數值及最簡方式表示。**
5. **比賽完結時監考員會收回桌上的草稿紙，但草稿紙上所書寫的任何文字或圖表將不獲評閱。**
6. **此問題簿的附圖不一定依比例繪成。**

For question 1 to 10, the answers must be expressed in integer or decimal.

由第 1 至 10 題，答案必須以整數或小數表示。

1) $1.627 - 0.95 = ?$ [1%]

2) $65.82 - 16.9 = ?$ [1%]

3) $18.2 \times 2.4 = ?$ [1%]

4) $9 \div 0.45 = ?$ [1%]

5) $52.8 \div 5 = ?$ [1%]

6) $12.8 \div 0.001 = ?$ [1%]

7) $63.8 \times 5\% = ?$ [1%]

8) $138 \div 15\% = ?$ [1%]

9) $24 \times 2.5 \div 30\% = ?$ [1%]

10) $333 - 90 \div 30\% = ?$ [1%]

For question 11 to 15, the answers must be expressed in proper fraction, integer or mixed number.

由第 11 至 15 題，答案必須以真分數、整數或帶分數表示。

11) Evaluate $\frac{1}{3} \div 50\% \times \frac{3}{4}$. [1%]

計算 $\frac{1}{3} \div 50\% \times \frac{3}{4}$ 。

12) Evaluate $2 + 18\frac{1}{3} \times 3$. [1%]

計算 $2 + 18\frac{1}{3} \times 3$ 。

13) Evaluate $7 \div \frac{21}{30} \times 20\%$. [1%]

計算 $7 \div \frac{21}{30} \times 20\%$ 。

14) Evaluate $\frac{1}{20} \div \left(\frac{4}{5} \times 5\% \right)$.

[1%]

計算 $\frac{1}{20} \div \left(\frac{4}{5} \times 5\% \right)$ 。

15) Evaluate $\frac{3}{1000} \times \left(8 \div \frac{1}{4}\% \right) - 5$.

[1%]

計算 $\frac{3}{1000} \times \left(8 \div \frac{1}{4}\% \right) - 5$ 。

- 16) Given $\angle A = 30^\circ$, $\angle B = x^\circ$, where $\angle A + \angle B = 180^\circ$. Classify $\angle B$ [2%]
according to its size.

已知 $\angle A = 30^\circ$ ， $\angle B = x^\circ$ ，且 $\angle A + \angle B = 180^\circ$ 。 $\angle B$ 是甚麼？

- | | |
|--------------------|----------------------|
| A. Acute Angle 銳角 | B. Right Angle 直角 |
| C. Obtuse Angle 鈍角 | D. Straight Angle 平角 |
| E. Reflex Angle 反角 | F. Round Angle 周角 |

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- 17) Out of 200 balls, 38 are blue, 30 are red and the rest are black. If [2.1%]
the difference between red balls and black balls is $y\%$ of all balls,
find the value of y .

在 200 個球中，38 個是藍色，30 個是紅色，餘下的是黑色。
若紅色球與黑色球數目之差佔全部球的 $y\%$ ，求 y 的值。

- 18) Which is the smallest number among the numbers below? [2.2%]

下列各數中，數值最小的數是哪一個？

A. $\frac{3}{850}$

B. $\frac{4}{5}\%$

C. 0.062

D. 8.3%

E. $\frac{1}{64}$

F. 17.3%

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- 19) Mandy folds a circular craft paper in half for 6 times, what is the size of the angle of a sector in degree/degrees? [2.3%]

芷若把一張圓形的手工紙對半摺 6 次後，一份扇形圓心角的大小是多少度？

- 20) Mum's daily salary decreases from \$625 to \$450, which is equivalent to an $x\%$ decrease. Find the value of x . [2.4%]

媽媽的日薪由 \$625 下降至 \$450，即減少了 $x\%$ 。求 x 的值。

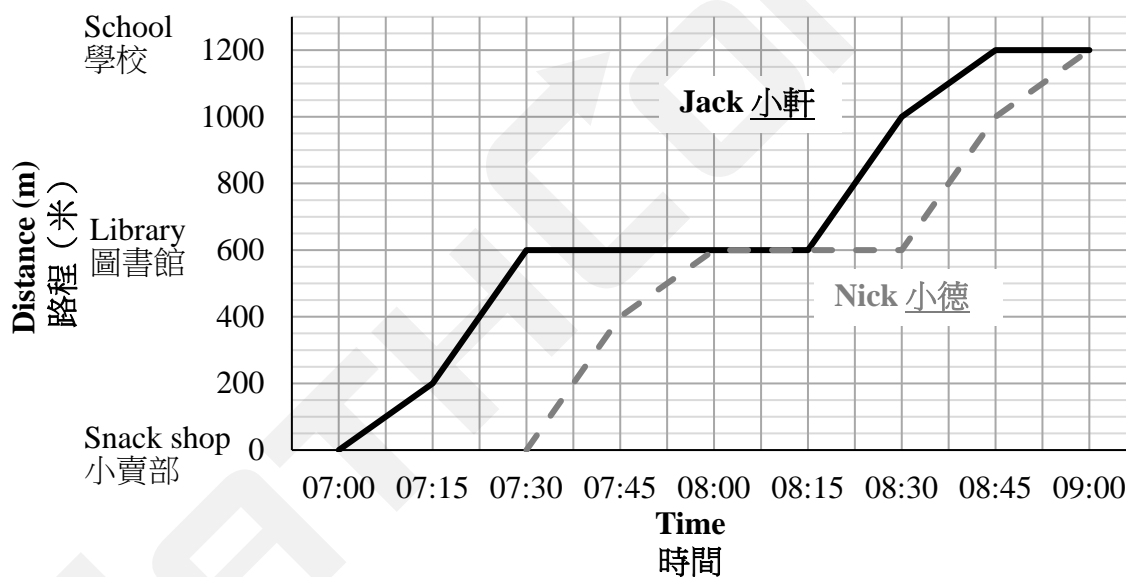
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- 21) In a bookstore, an English novel costs \$82.20. An English novel is \$8.90 more expensive than a Chinese novel. If Mum has \$235, and she buys as many Chinese novels as she can, how much does she have left? [2.5%]

一間書店的英文小說售 \$82.2，英文小說比中文小說貴\$8.9。
如果媽媽有 \$235，她盡可能多地買下中文小說後，還餘下多少元？

- 22) The following is the travel graph of Jack and Nick walking from the snack shop to the school. The library is 600 m away from the snack shop and the school is 1200 m away from the snack shop. Given that Jack and Nick stayed in the library for some time before reaching school. Find the difference in km/h between the average walking speeds of Jack and Nick from 08:30 to 08:45. [2.6%]

以下是小軒和小德由小賣部走至學校的行程圖。小賣部距離圖書館 600 米，而小賣部距離學校 1200 米。已知小軒和小德到達圖書館後停留了一段時間。請以公里每小時表示二人由 08:30 至 08:45 期間的平均速度差。

The travel graph of two students
兩位同學的行程圖



- 23) Find the area of a semi-circle in cm^2 if its perimeter is 257 cm. (Take π as 3.14.) [2.7%]

若半圓的周界是 257 cm，該半圓的面積是多少 cm^2 ？
(取 π 為 3.14。)

- 24) A cuboid tank contains some water. The teacher pumps 25 cm^3 of water out of the tank, then puts 3 tiny stones of the same volume into the tank such that the stones are completely submerged in the water without leaking. If the base area of the tank is 40 cm^2 , and the overall increase in water level is 8 cm, find the volume of a tiny stone in cm^3 . [2.8%]

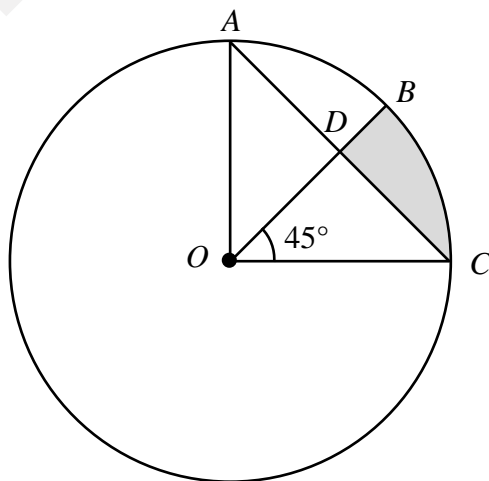
一個長方體容器內有些水。老師先抽去 25 cm^3 的水，再把三塊體積相同的小石頭放進容器內，使小石頭完全浸於水內，且沒有溢出。若容器的底面積是 40 cm^2 ，且整體水位上升了 8 cm，一塊小石頭的體積是多少立方厘米？

- 25) The heights of Ada, Ben, Calvin, Dan and Edwin are 147.8 cm, 164.3 cm, 157.7 cm, 151.8 cm and 178.4 cm respectively. Two people joined the team, and the average height of the team is increased by 4.8%. What is the sum of heights of the two newly joined people in m? [2.9%]

甲、乙、丙、丁和戊的身高分別是 147.8 cm、164.3 cm、157.7 cm、151.8 cm 和 178.4 cm。有 2 人加入該組，使該組的平均身高增加了 4.8%。新加入的 2 人身高總和是多少米？

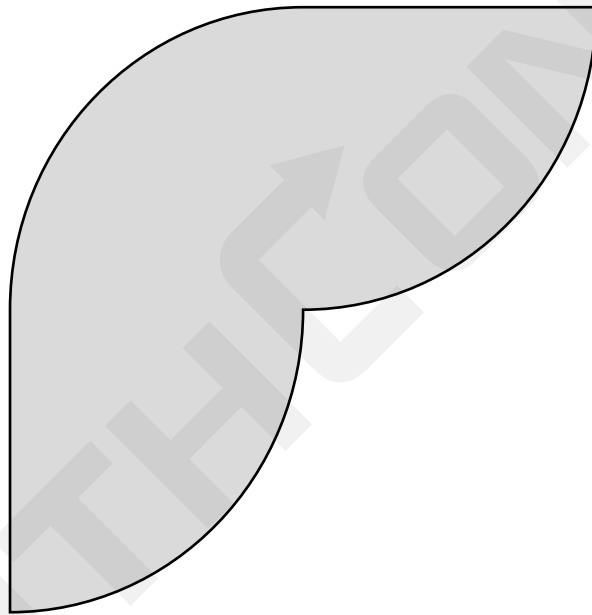
- 26) The following shape is formed by a right-angled triangle OAC , a circle and a straight line ODB , where O is the centre of the circle. Given $OB = 14$ cm and $\angle BOC = 45^\circ$. Find the area of the shaded region BCD in cm^2 . (Take π as $\frac{22}{7}$.) [3%]

以下的圖案由一個直角三角形 OAC 、一個圓和一條直線 ODB 組成，其中 O 是圓心。已知 $OB = 14$ cm，且 $\angle BOC = 45^\circ$ 。陰影部分 BCD 的面積是多少 cm^2 ？（取 π 為 $\frac{22}{7}$ 。）



- 27) The following shape is formed by some quarter-circles. The [3.1%]
 perimeter of the shape is $56\frac{2}{5}$ cm. Terry plans to paint the whole
 shape with acrylics. If each cm^2 of acrylic paint costs \$0.25, find
 the cost of painting the whole shape in dollars. (Take π as $\frac{22}{7}$.)

以下圖形由數個四分一圓組成，而這個圖形的周界是 $56\frac{2}{5}$ 厘
 米。小文打算把整個圖形都填上塑膠彩。若每使用 1 cm^2 的塑
 膠彩成本為 \$0.25，填上整個圖形需付多少元？
 （取 π 為 $\frac{22}{7}$ 。）



28) Solve the equation $\frac{0.5(3x+7)}{x} = 6\frac{1}{4}$. [3.2%]

解方程 $\frac{0.5(3x+7)}{x} = 6\frac{1}{4}$ 。

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- 29) Dad mixed together some green tea, milk and water to make a cup of milk tea. The amount of milk is half of the amount of green tea, and the amount of water is $\frac{2}{5}$ of the amount of milk. If $x\%$ of the amount of milk tea is water, find the value of x . [3.3%]

爸爸把綠茶、牛奶和水混合成牛奶綠茶。已知牛奶的份量是綠茶的一半、水的份量是牛奶的 $\frac{2}{5}$ 。若水佔牛奶綠茶的份量的 $x\%$ ，求 x 的值。

- 30) If the value of a two-digit number is 8 times the sum of its digits, [3.4%]
find that number.

某兩位數的數值是該數的數字之和的 8 倍。求該數。

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- 31) Terry left his wallet in a shop after shopping. After 10 minutes, the [4%]
shopkeeper found his wallet, and tried to chase him back by
following the exact route Terry had taken. Terry walked 480 m in
10 minutes, and he kept walking with the same speed. If the
shopkeeper spent 5 minutes to chase Terry back, find the average
running speed of the shopkeeper in m/min.

小福在某商店購物後遺下銀包。10 分鐘後，店員發現了他的銀包，並立刻沿著小福走過的路線追回小福。小福在 10 分鐘內已走了 480 米，並以相同步速繼續行走。如果店員最後花了 5 分鐘追回小福，店員的平均跑步速率是多少米每分鐘？

- 32) The ages of Henry, Tina and Susan are three consecutive even numbers. Find the sum of their ages if the product of the three numbers is 10560. [4.1%]

甲、乙和丙的歲數是三個連續雙數。若三人歲數的積是10560，求他們歲數之和。

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- 33) The product of $\frac{6308}{24975}$ and 4000% is a recurring decimal. Find the difference between the digit in the ten thousandths place and the 266th digit after the decimal point. [4.2%]

$\frac{6308}{24975}$ 和 4000% 的積是一個循環小數。求萬分位和小數點後第266個位的數字之差。

34) If $6 \times \frac{1}{5 + \frac{1}{3 + \frac{1}{1 + \frac{1}{\eta}}}} - 1 = \frac{25}{176}$, find $\frac{1}{9 + \frac{6}{4 + \frac{4}{1 + \frac{2}{\left(\frac{\eta}{8}\right)}}}}$. [4.3%]

若 $6 \times \frac{1}{5 + \frac{1}{3 + \frac{1}{1 + \frac{1}{\eta}}}} - 1 = \frac{25}{176}$ ，求 $\frac{1}{9 + \frac{6}{4 + \frac{4}{1 + \frac{2}{\left(\frac{\eta}{8}\right)}}}}$ 。

- 35) There are 10 light bulbs, namely 1, 2, 4, 8, ..., 512. A number can be represented by turning on the bulbs. For example, 13 can be represented by turning on the bulbs 1, 4 and 8. If bulb 16 is broken, how many 3-digit numbers can be represented by the remaining bulbs? [4.4%]

現有 10 個燈泡，各自代表數字 1、2、4、8、...、512。一個數字可以用開燈來表示，例如 13 可以用開着代表 1、4 和 8 的燈泡來表示。如果代表 16 的燈泡壞掉，餘下的燈泡可以代表的三位數有多少個？

- 36) N is a 3-digit number. When N is divided by 4 or 7, the remainder is 1. How many possible values of N are there if N is not a multiple of 5? [4.5%]

N 是一個三位數。當 N 除以 4 或 7 時，餘數都是 1。如果 N 不是 5 的倍數， N 有多少個可能值？

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- 37) Given $a \star b = \{\text{the remainder of } b \div a\}$. Find the value of $99 \star 2 + 99 \star 4 + 99 \star 6 + \cdots + 99 \star 1000 + 99 \star 1002$. [4.6%]

已知 $a \star b = \{b \div a \text{ 的餘數}\}$ 。

求 $99 \star 2 + 99 \star 4 + 99 \star 6 + \cdots + 99 \star 1000 + 99 \star 1002$ 的值。

- 38) Previously, a job takes 7.5 days to complete if Ada, Betty and Clare work together. When Ada and Clare work together, it takes 15 days. When Betty and Clare work together, it takes 12 days.

Now, Ada, Betty and Clare are working alone one after another for 8 days, 4 days and 1 day respectively, then all three of them work together to finish the job. But Betty is now being lazy and her efficiency is halved, where the efficiency of Ada and Clare remains unchanged. All of them work for 8 hours per day. How many hours are needed to complete the entire job?

一份工作，甲、乙、丙三人合作完成需 7.5 天。甲和丙合作完成需 15 天，乙和丙合作完成需 12 天。

現在甲、乙和丙依次序單獨工作 8 天、4 天和 1 天，餘下工作三人合作完成。可是，乙現在工作時偷懶，他的工作效率減半，而其他人的工作效率沒有改變，且每人每日工作 8 小時，共需多少小時完成該工作？

- 39) David takes his brother's phone secretly, and he is guessing the password of the phone. He knows the password is a 5-digit number, in which no two digits are the same. After 9 failing attempts, he finally makes a correct guess in the 10th attempt. It turns out the password is an even number. He realizes he got 2 of the correct digits but not in their correct places in every previous 9 attempts. What is the password? (Write the digits in the correct order.) [4.8%]

小明偷偷拿了哥哥的手機，他正嘗試猜手機的密碼。他知道密碼是一個 5 位數，且數字沒有重複。經過 9 次的嘗試後，他終於在第 10 次猜對密碼。小明發現密碼是雙數，而以往 9 次嘗試都剛好猜對了 2 個數字，但位置都不對。小明哥哥的手機密碼是多少？（請順次序填寫。）

1st attempt 第一次：02164

2nd attempt 第二次：56280

3rd attempt 第三次：80635

4th attempt 第四次：68307

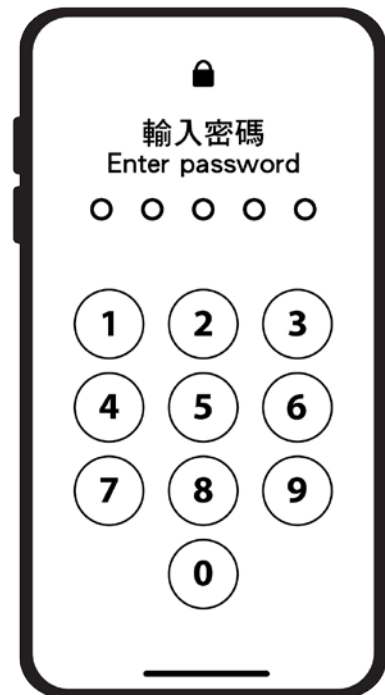
5th attempt 第五次：71026

6th attempt 第六次：27563

7th attempt 第七次：16052

8th attempt 第八次：63041

9th attempt 第九次：32867



40) Find the value of the following expression.

[4.9%]

求以下數式的值。

$$\frac{10302}{1^2+1} + \frac{10302}{1^2+3 \times 1+2} + \frac{10302}{2^2+2} + \frac{10302}{2^2+3 \times 2+2} + \cdots + \frac{10302}{100^2+100} + \frac{10302}{100^2+3 \times 100+2}$$

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ANSWER SHEET

REG NO			P6
NAME			
GRADE			
SEAT			

☐ IDCHECK

☐ ABSENT

ANSWER		ANSWER		ANSWER		ANSWER	
1	0.677	11	$\frac{1}{2}$	21	15.1(0)	31	144
2	48.92	12	57	22	0.8 (km/h)	32	66
3	43.68	13	2	23	3925 (sq units)	33	9
4	20	14	$1\frac{1}{4}$	24	115 (cm ³)	34	$\frac{1}{10}$
5	10.56	15	$4\frac{3}{5}$	25	3.7376 (m)	35	452
6	12800	16	C	26	28 (cm ²)	36	26
7	3.19	17	51	27	(\$)41.58	37	24297
8	920	18	A	28	$\frac{14}{19}$	38	140 (hrs)
9	200	19	5.625	29	$11\frac{13}{17}$	39	45718
10	33	20	28	30	72	40	15250

