



INSTRUCTIONS

- 1. There are 47 questions in this paper.
- 2. Time allowed is 65 minutes.
- 3. Answer ALL questions in the separate ANSWER BOOKLET.
- 4. The use of HKEAA approved calculators is permitted.
- 5. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
- 6. Rough work should be done on the rough work sheet provided.
- 7. The diagrams in this paper are not necessarily drawn to scale.

FORMULAS FOR REFERENCE

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Sector	Arc length	=	$2\pi r \times \frac{\theta}{360^{\circ}}$
	Area	=	$\pi r^2 \times \frac{\theta}{360^\circ}$
Sphere	Surface area	=	$4\pi r^2$
	Volume	=	$\frac{4}{3}\pi r^3$
Cylinder	Curved surface area	=	$2\pi rh$
	Volume	=	$\pi r^{-}h$
Cone	Curved surface area	=	πrl
	Volume	=	$\frac{1}{3}\pi r^2h$
Prism	Volume	=	base area × height
Pyramid	Volume	=	$\frac{1}{3}$ × base area × height

SECTION A: Choose the best answer for each question. You should mark all your answers in the ANSWER BOOKLET.

- 1. Determine whether to estimate or to compute the exact value in each of the following situations.
 - (i) The astronomy club of a school recorded the rainfall amounts in the New Territories in May this year.
 - (ii) Hong Kong Observatory recorded the number of red rainstorm signals issued in May this year.

	(i)	(ii)
A.	To estimate	To compute the exact value
B.	To estimate	To estimate
C.	To compute the exact value	To compute the exact value
D.	To compute the exact value	To estimate

- 2. The number of positive integers less than $\sqrt{73}$ is
 - A. 6.
 - B. 7.
 - C. 8.
 - D. 9.
- 3. Determine whether a rate or a ratio should be used to relate the quantities in each of the following statements.
 - (i) 3 identical microwave ovens worth \$2 460 in total.
 - (ii) The prices of a fan and a rice cooker are \$480 and \$640 respectively.

	(i)	(ii)
A.	Ratio	Rate
B.	Rate	Ratio
C.	Rate	Rate
D.	Ratio	Ratio

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- 4. $a \times a + b \times b =$
 - A. 2a + 2b.
 - B. 2*ab*.
 - C. $(a + b)^2$.
 - D. $a^2 + b^2$.
- 5. Last week, the total price of 8 cups of ice-cream was x. If the price of each cup of ice-cream is increased by \$4 this week, then the total price of 7 cups of ice-cream is x. Which of the following equations can be used to find the value of x?
 - A. $\frac{x}{8} + 4 = \frac{x}{7}$ B. $\frac{x}{8} - 4 = \frac{x}{7}$ C. $\frac{x+4}{8} = \frac{x}{7}$ D. $\frac{x-4}{8} = \frac{x}{7}$

6. Which of the following may represent the graph of the equation x + 5y + 5 = 0?





The above figure shows the graphs of 3x - 2y + 18 = 0 and 3x - y + 12 = 0.

According to the given graphs, solve the simultaneous equations $\begin{cases} 3x - 2y + 18 = 0\\ 3x - y + 12 = 0 \end{cases}$ graphically.

- A. (6, –2)
- B. (0, 9)
- C. (-2, 6)
- D. (-4,0)

8. If x < y, which of the following inequalities is correct?

- A. 6x > 6y
- B. -6x > -6y
- C. $\frac{x}{6} > \frac{y}{6}$
- D. x 6 > y 6

- 9. The width of a computer monitor is 55 cm (correct to the nearest cm). Which of the following could be its actual width?
 - A. 54.4 cm
 - B. 54.6 cm
 - C. 55.5 cm
 - D. 55.6 cm

10.



The solid in the figure is a regular tetrahedron. Each of its side length is a. By considering the **dimensions**, which of the following could be expressed by $\sqrt{3}a^2$?

- A. Total sum of the lengths of the solid
- B. Height of the solid
- C. Total surface area of the solid
- D. Volume of the solid
- 11. In the figure, BCD is a straight line. Which of the following is a straight angle?
 - A. $\angle ACB$
 - B. $\angle BCD$
 - C. $\angle CBA$
 - D. $\angle DCA$





Will the size and shape of the above figure be changed after reflection?

	Size	Shape
A.	changed	changed
B.	changed	unchanged
C.	unchanged	changed
D.	unchanged	unchanged

13. In the figure, AC and BD are straight lines. x and y are

- A. alternate angles.
- B. adjacent angles.
- C. corresponding angles.
- D. vertically opposite angles.



14. The figure shows a cube *PQRSTUVW*. Which of the following is a plane of reflectional symmetry of the cube?



- A. QRSP
- B. QRWV
- C. PSWV
- D. PSTU

15.



Which of the following nets can be folded into the regular tetrahedron above?



- 16. In the figure, *BQC* and *APRB* are straight lines. In $\triangle ABC$, AR = RB = 21 cm. $QR \perp AB$ and $CP \perp AB$. Which of the following is an altitude of $\triangle ABC$?
 - A. *CP*
 - B. CR
 - C. QR
 - D. AC



- 17. A(7, 4) and B(1, 0) are two points in the rectangular coordinate plane. The coordinates of the mid-point of AB are
 - A. (6, 4).
 - B. (8, 4).
 - C. (3, 2).
 - D. (4, 2).



18. Find the value of $\tan \theta$ in the figure.



- 19. A university is doing a survey on the online learning of Hong Kong secondary school students. Which of the following is the most suitable method to collect data?
 - A. Obtain the number of student online accounts from a publisher.
 - B. Conduct a survey of all secondary school students in Hong Kong using questionnaires.
 - C. Study the relevant reports from regions other than Hong Kong.
 - D. Search for the sales figures of tablets in the last year.

20. The cumulative frequency polygon below shows the donations of 140 Secondary 3 students in a charitable event.



Donations of Secondary 3 students in a charitable event

If the amount donated by a student is \$40 or above, the student can get a certificate. How many Secondary 3 students can get the certificate?

- A. 20 students
- B. 50 students
- C. 60 students
- D. 80 students

SECTION B: Write ALL the answers in the ANSWER BOOKLET. Working need not be shown.

21. A tuckshop used directed numbers to represent its monthly profit and loss.
For example,
-2 000 dollars represents that the loss of the tuckshop was 2 000 dollars.

Use a directed number to represent each of the following situations:

- 1 5
- (i) The profit of the tuckshop in May was 5 500 dollars.
- (ii) The loss of the tuckshop in June was 3 200 dollars.
- 22. Calvin measured and found the value of the speed of light was 299 000 000 m/s in an experiment. Use scientific notation to represent this speed.
- 23. Use the symbol '×' to mark the number $\sqrt{3}$ on the number line given in the ANSWER BOOKLET. Example: $\sqrt{3} + 1$ is marked on the number line below.



24. Find the values of x and y in the following arithmetic sequences.

4, 7, 10, 13, 16, x, y,...

- 25. Expand $(4 x^3)(2x)$.
- 26. Factorize $x^2 + x 20$.

- 27. Expand $(5x + 1)^2$.
- 28. Consider the formula $D = b^2 4ac$. If a = 3, b = 2 and c = -1, find the value of D.
- 29. In the ANSWER BOOKLET, fill in the box with > or < to express the relation between the numbers.



30. The figure shows the diagram of a triangular prism:



Referring to the sketch shown above, add 1 solid line and 1 dotted line in the figure provided in the **ANSWER BOOKLET** so as to form a diagram of a **pyramid with square base**.

31.



According to the given information in the above figure,

(a) identify whether $\triangle ABC$ and $\triangle CDE$ are congruent or similar triangles, and

(b) choose the correct reason.

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32. In the figure, $\triangle ACD$ is an equilateral triangle. It is given that $\angle BED = 100^\circ$, find x.



33. Find the coordinates of point R in the figure.

1								 	
					7	Y N			
					1				
					+ 、	R			
					י ר				
					2				
									L r
									$\sim \lambda$
	_4	1	_	2	0		2	4	
	4	4	_	2	0		 2	 4	
	4	4		2	0 -2-		 2	 4	
		1		2	0 -2-		 2	 4	
		4		2	0 -2 - -4 -		2	4	

- 34. Find the distance between two points J(4, 22) and K(12, 7) in the rectangular coordinate plane.
- 35. Find the value of x in the figure. (Correct to 3 significant figures)



36. The following data show the number of late arrivals in each class of a secondary school last month.

2	10	11	0	5	9
6	15	6	25	0	22
18	13	17	12	4	7

Use the data to complete the two frequency distribution tables in the ANSWER BOOKLET.

37. The broken line graph below shows the pollutant concentrations of nitrogen dioxide ($\mu g/m^3$) recorded at Kwun Tong monitoring station last week.



According to the above broken line graph, answer the following questions.

- (a) How many days was the concentration of nitrogen dioxide higher than $40 \,\mu\text{g/m}^3$ last week?
- (b) On which two consecutive days did the concentration of nitrogen dioxide increase most last week?
- (c) What was the difference between the concentration of nitrogen dioxide recorded on Friday and Saturday?

38. Class 3A participated in an interclass English Speech Competition. The following table shows the weight of each marked item and its marks in these items.

	Assessment Item					
	Presentation	Creativity	Collaboration			
	Skills	Creativity	Skills			
Mark	72	96	84			
Weight	60%	10%	30%			

Find the weighted mean mark of Class 3A.

39. Chris draws a character from a computer game 60 times. Below shows the frequency and the types of characters drawn.

Type of Character	Animal	Alien	Human	Others
Frequency	25	12	20	3

Find the empirical probability that Chris draws an alien from the game.

SECTION C: All working must be clearly shown. Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.

40. A concert hall has <u>31</u> aisles. Each aisle has <u>58</u> seats. Estimate the number of seats in this hall and judge whether it has enough seats for 1 500 people.

Based on the description above, give an appropriate approximation for each of the **UNDERLINED VALUES** respectively. Use these 2 approximations for estimating the total number of seats in the hall. Briefly explain whether there are enough seats.

41. Catherine made a deposit into a bank. The simple interest rate is 4% p.a. She will receive\$520 interest after 2 years. Find the principal of her deposit.

42. Complete the table for the equation x - 4y = 4 in the **ANSWER BOOKLET**.

x	- 4	0	4
у		-1	

According to the table, draw the graph of this equation on the rectangular coordinate plane given in the **ANSWER BOOKLET**.

- 43. (a) Simplify $(3y)^2$ and express the answer with positive index.
 - (b) Simplify $\frac{1}{y^5}(3y)^2$ and express the answer with positive index.

44. In the figure, ABC and FBD are straight lines. $\angle FBA = 57^{\circ}$ and $\angle FDE = 123^{\circ}$. Prove that AC // DE.



45. In the figure, the base of the prism is a trapezium. The upper base, lower base and height of the trapezium are 3 cm, 6 cm and 8 cm respectively. The height of the prism is 10 cm. Find the volume of the prism.6 cm



46. In the figure, *BCD* is a straight line. $\angle ACB = 35^{\circ}$ and $\angle ADC = 15^{\circ}$. Find x.



47. The table below shows the take-away waiting time (minute) of 40 customers in a restaurant.

Time (minute)	0 - 4	5 – 9	10 - 14	15 – 19
Frequency	5	16	13	6

- (a) According to the above table, complete the frequency distribution table in the **ANSWER BOOKLET**.
- (b) Find the mean take-away waiting time of the 40 customers.

END OF PAPER

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Answers written on this page will not be marked.

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