

Education Bureau Territory-wide System Assessment 2015 Secondary 3 Mathematics QUESTION BOOKLET

INSTRUCTIONS

- 1. There are 50 questions in this paper.
- 2. The 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	=	$\pi r^2 h$
Cone	Curved surface area	=	πrl
	Volume	=	$\frac{1}{3}\pi r^2h$
Prism	Volume	=	base area \times 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) Total population of the World.
 - (ii) The number of textbooks bought by John in the new academic year.

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

- 2. The thickness of a piece of paper is 0.000 95 cm. Use scientific notation to represent this number.
 - A. $9.5 \times 10^{-3} \text{ cm}$
 - B. 9.5×10^{-4} cm
 - C. 0.95×10^{-3} cm
 - D. 0.95×10^{-4} cm

3. (-3y)(-3y) =

- A. 2(-3y).
- B. $-3y^2$.
- C. $-3^2 y^2$.
- D. $(-3y)^2$.

4. Which of the following is a polynomial?

A.
$$2x^{2} + 3\sqrt{x}$$

B. $\frac{x^{2}}{2} + 3x$
C. $2^{x} + 3x$
D. $2x^{2} + \frac{1}{3x}$

5.
$$(-3)^{-3} =$$

A. 27. B. -27.C. $\frac{1}{27}.$ D. $-\frac{1}{27}.$

6. Which of the following statements is correct?

- A. The root of 3x 1 = -2 is -1.
- B. The root of 5x 2 = -8 is -2.
- C. The root of 7x + 3 = -18 is -3.
- D. The root of 9x + 4 = -40 is -4.

7. The price of a packet of potato chips is 3 times that of a can of soft drink. Tony spends \$138 to buy 5 packets of potato chips and 8 cans of soft drinks. The prices of a packet of potato chips and a can of soft drink are x and y respectively. Which of the following pairs of simultaneous equations shows the relation between x and y?

A.
$$\begin{cases} y = 3x \\ 8x + 5y = 138 \end{cases}$$

B.
$$\begin{cases} y = 3x \\ 5x + 8y = 138 \end{cases}$$

C.
$$\begin{cases} x = 3y \\ 8x + 5y = 138 \end{cases}$$

D.
$$\begin{cases} x = 3y \\ 5x + 8y = 138 \end{cases}$$

8.



The above figure shows the graphs of 10x+8y-11=0 and 8x-5y-2=0. Solve the simultaneous equations $\begin{cases} 10x+8y-11=0\\ 8x-5y-2=0 \end{cases}$ graphically.

- A. The exact solution of the simultaneous equations is (1, 1).
- B. The exact solution of the simultaneous equations is (0.5, 0.5).
- C. The approximate solution of the simultaneous equations is (0.5, 0.5).
- D. There are no solutions.



The above figure shows Container *A* and Container *B* with different graduations. There is some water in each container. Shirley wants to find the volume of a five-dollar coin. Which of the following methods is the best?

- A. Shirley puts 10 five-dollar coins in Container *A*, measures the volume increased, and then divides the volume by 10.
- B. Shirley puts 10 five-dollar coins in Container *B*, measures the volume increased, and then divides the volume by 10.
- C. Shirley puts a five-dollar coin in Container A and measures the volume increased.
- D. Shirley puts a five-dollar coin in Container *B* and measures the volume increased.
- 10. In the figure, the radius of the circle is 13 cm. Find its area.
 - A. $13\pi \text{ cm}^2$
 - B. $26\pi \text{ cm}^2$
 - C. $169\pi \text{ cm}^2$
 - D. $676\pi \,\mathrm{cm}^2$



- 11. The ratio of the volumes of two similar cones is 1 : 27. Which of the following is the ratio of their corresponding heights?
 - A. 1:3
 - **B**. $1^2: 3^2$
 - C. $1^3:3^3$
 - D. $1^3:27^3$

- 12. Which of the following represents a point shown in the figure?
 - A. *P*
 - B. *PQ*
 - C. $\angle QPS$
 - D. PQRS
- 13. Which of the following 3-D figures can be made by the net on the right?











A.







14.



Find the image of the above figure after rotating about O through 90° in an anticlockwise direction.



Which of the following triangles is congruent to the $\triangle DEF$ as shown in the above figure?



16. Which of the following nets can be folded into a cube?





- 17. In the figure, G(5, -3) is rotated about the origin O through 180° to G'. The coordinates of G' are
 - A. (-5, -3). B. (-5, 3).
 - C. (-3, 5).
 - D. (3, -5).



18. A(10, 100) and B(12, 120) are two points in a rectangular coordinate plane. The mid-point of AB is

- A. (1, 10).
- B. (2, 20).
- C. (11, 110).
- D. (22, 220).

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19. The cumulative frequency polygon below shows the results of the 50 m freestyle event of 14 boys in a swimming gala.



Which of the following histograms can be used to construct the above diagram?





20. Mr. Lee owns 5 shops. The monthly rents (\$) of the shops are as follows:

25 000, 22 000, 6 000, 21 000, 25 000

Mr. Lee says, 'The arithmetic mean of the rents is \$19 800, therefore the rents of more than half of the shops are under \$20 000.'

Which of the following best explains why Mr. Lee's statement is misleading?

- A. The data values are not arranged in order.
- B. The mode is not equal to the arithmetic mean.
- C. Mr. Lee does not get the correct arithmetic mean.
- D. Mr. Lee applies the concept of median to the arithmetic mean.

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

- 21. (a) Calculate -(-3)(-5).
 - (b) Calculate -3 (-5).
- 22. Stephen has 40 balls, which are in red, yellow or green. The numbers of red balls and yellow balls are 10 and 13 respectively.Find number of red balls : number of yellow balls : number of green balls.
- 23. Find the values of *x* and *y* in the following arithmetic sequence.

 $-35, -20, -5, x, y, \ldots$

- 24. Simplify $(5x^2 + 3x) (7x^2 6x)$.
- 25. Expand (x+1)(3x-1).
- 26. Factorize kx + x + ky + y.

- 27. Draw the graph of the equation x + y 2 = 0 on the rectangular coordinate plane given in the **ANSWER BOOKLET**. The range of *x* must include the values from -2 to 2.
- 28. Expand $(2-x)^2$.
- 29. Consider the formula $\frac{x}{2} + \frac{y}{3} + \frac{z}{4} = 7$. If x = 4 and y = 9, find the value of z.

30. Make *P* the subject of the formula $N = 1 + \frac{P}{4}$.

- 31. Solve the inequality 2x+1 > -7.
- 32. The figure shows the diagram of a cuboid:



Referring to the sketching shown above, add solid line(s) and dotted line(s) in the figure provided in the **ANSWER BOOKLET** so as to form a diagram of a **triangular prism**.





In the figure, $\triangle ABC \cong \triangle DEF$. Find

- (a) the value of x,
- (b) the value of *y*.

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34. In the figure, $\triangle ABC$ is an isosceles triangle. AB = AC, $\angle ABC = 2x$ and $\angle BAC = 4x$. Find x.



- 35. The figure shows a cube *PQRSTUVW*. F and G are the mid-points of *PU* and *RW* respectively. Which of the following are axes of rotational symmetry of the cube? (MORE THAN one answer)
 - (I) *RU*
 - (II) ST
 - (III) FG
 - (IV) FW



36. In the figure, *VABCD* is a pyramid with a rectangular base. Its base *ABCD* is a horizontal plane and its height is *VC*. Name the angle between *VB* and the plane *ABCD*.







38. P(-4, 1) is translated 3 units upwards to P'. Find the coordinates of P'.

			/	y					
			4 -						
			4						
			2-						
P (-4,	1)	2						
^									x
-4	_	2	0		2	2	2	4	,
_4		2	0		2	2	2	4	
_4		2	0 -2-			2	2	4	,
_4		2	0			2	2	4	
-4		2	0 -2- -4-			2	2	4	

39. The following chart shows the record of relative humidity (%) in Cheung Chau on one day.



The record of relative humidity (%) in Cheung Chau on one day

According to the above chart, answer the following questions.

- (a) At what time was the relative humidity equal to 65%?
- (b) What was the difference of the relative humidity between 19:00 and 22:00?
- (c) At what time did the relative humidity increase most compared to the relative humidity of one hour before?

40. The cumulative frequency polygon below shows the body temperature of 25 students.



The body temperature of 25 students

How many students have a body temperature of 37.5°C or above?

41. The table below shows the marks that Cindy got in different sub-papers of a music examination and the weight of each sub-paper.

	Sub-paper					
	Performing	Theory	Creating	Listening		
Mark	90	75	66	84		
Weight	35%	30%	25%	10%		

Find the weighted mean mark of Cindy.

- SECTION C: All working must be clearly shown. Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.
- 42. Peter sells a jacket at a profit of 55%. If the profit is \$330, find the cost price of the jacket.
- 43. Michael bought a smartphone for \$4 400 two years ago. Its value has decreased by 35% each year. Find the present value of the smartphone.
- 44. (a) Simplify $(x^{-4})^{-2}$ and express the answer with positive index. (b) Simplify $\frac{(x^{-4})^{-2}y^3}{y^6}$ and express the answer with positive indices.
- 45. In the figure, AD = CD and $\angle ADB = \angle CDB$. Prove that $\triangle ABD \cong \triangle CBD$.



46. In the figure, the radius of sector *OAB* is 6 cm and $\angle AOB = 50^{\circ}$. Find the area of the sector. Correct the answer to the nearest 0.1 cm².



47. The figure shows a cylinder. Its height is 9 cm and its base diameter is 8 cm. Find the volume of the cylinder. Express the answer in terms of π .



48. In the figure, there are 2 computer rooms and 7 classrooms along the two sides of a corridor. The length of each computer room is 12 m. Estimate the length of the corridor and explain your estimation method.

k <u>−12 m</u>							$\xrightarrow{12 \text{ m}}$			
				Compu Room	ater A	C F	omputer Room B			
	Corridor									
Class 3A	Class 3B	Class 3C	Class 3D	Class 3E	Clas 4A	s	Class 4B			

49. In the figure, 3 identical boxes of tissues are placed in a cabinet. The length of each box is 22 cm and BC = 12 cm. Find θ . (Correct to 3 significant figures)



50. The table below shows the weights of 60 suitcases.

Weight (kg)	16 – 20	21 – 25	26 - 30	31 – 35
Frequency	8	32	14	6

Find the mean weight of the 60 suitcases.

END OF PAPER

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