

2017年台北市市長盃國際數學心算競賽 (2017.8.12)

中學數學試題解答

中學一年級

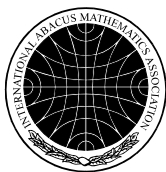
第一項目												同分加賽			
題數	答案	題數	答案	題數	答案	題數	答案	題數	答案	題數	答案	題數	答案	題數	答案
1	A	6	D	11	D	16	A	21	A	26	B	1	A	6	B
2	C	7	B	12	C	17	B	22	B	27	A	2	C	7	D
3	D	8	A	13	B	18	D	23	C	28	A	3	D	8	A
4	B	9	C	14	A	19	C	24	D	29	D	4	B	9	C
5	D	10	A	15	D	20	B	25	C	30	B	5	C	10	C

中學二年級

第一項目												同分加賽			
題數	答案	題數	答案	題數	答案	題數	答案	題數	答案	題數	答案	題數	答案	題數	答案
1	A	6	D	11	D	16	B	21	C	26	B	1	B	6	A
2	D	7	C	12	C	17	A	22	C	27	B	2	D	7	C
3	B	8	C	13	A	18	B	23	A	28	D	3	C	8	A
4	C	9	A	14	B	19	C	24	B	29	C	4	C	9	D
5	D	10	B	15	C	20	B	25	D	30	A	5	A	10	B

中學三年級

第一項目												同分加賽			
題數	答案	題數	答案	題數	答案	題數	答案	題數	答案	題數	答案	題數	答案	題數	答案
1	C	6	A	11	C	16	A	21	A	26	A	1	B	6	A
2	B	7	B	12	B	17	B	22	D	27	C	2	D	7	C
3	C	8	A	13	D	18	B	23	B	28	D	3	A	8	B
4	D	9	C	14	B	19	C	24	B	29	B	4	B	9	B
5	A	10	D	15	A	20	D	25	C	30	D	5	C	10	D



Student ID. \_\_\_\_\_

## The Seventh Grade Set 1

Time Allowed :15 minutes

( )1. Reduce to similar terms  $(4x-3y+5) - 3(2x-y+8) =$

- (A)  $-2x-19$   
 (B)  $-2x+19$   
 (C)  $10x-1$   
 (D)  $10x+1$

( )2. Using elimination by addition or subtraction, find the solution to the simultaneous equations  $\begin{cases} 4x-6y=-8 \\ 4x+3y=10 \end{cases}$ , find  $x+y=?$

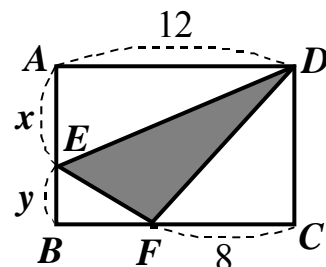
- (A) 1            (B) -1  
 (C) 3            (D) -3

( )3. Which of the following group is the solution to  $\begin{cases} 6x+y=50 \\ 2x+3y=70 \end{cases}$  ?

- (A)  $x=5, y=25$   
 (B)  $x=7, y=15$   
 (C)  $x=6, y=10$   
 (D)  $x=5, y=20$

( )4. As shown below,  $ABCD$  is a rectangle, if  $x=5, y=3$ , then the gray shaded area is

- (A) 26  
 (B) 28  
 (C) 30  
 (D) 32



( )5.  $2017 \times 20002000 - 2000 \times 20172017 =$

- (A) 2017            (B) 20170000  
 (C) 4034            (D) 0

( )6. The solution of  $\begin{cases} ax+by=26 \\ bx+ay=22 \end{cases}$  is  $x=3, y=5$ , what is the value of  $a+b$ ?

- (A) 7  
 (B) 4  
 (C) 5  
 (D) 6

( )7. If dual linear equation  $\frac{x+9}{9} - \frac{y-12}{12} = 0$ , then  $\frac{x}{9} - \frac{y}{12} = ?$

- (A) -1  
 (B) -2  
 (C) 1  
 (D) 2

( )8. There are two numbers  $A$  and  $B$ ,  $A$  divided by  $B$ , the quotient is 1, the remainder is 7; 3 times  $B$  divided by  $A$ , the quotient is 1, the remainder is 5, then  $A+B=$

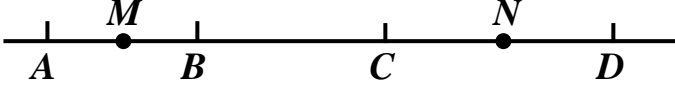
- (A) 19            (B) 20  
 (C) 21            (D) 22

( )9. 5 grams of sugar is added to a cup of 20 grams pure water, the sugar concentration is 20%. How many more grams of sugar must be added to make the sugar concentration of the water in this cup 30%?

- (A)  $2\frac{4}{5}$     (B)  $3\frac{2}{5}$     (C)  $3\frac{4}{7}$     (D)  $3\frac{5}{7}$  grams

( )10. Let  $x : y : z = 3 : 5 : 7$ , the ratio of  $(x+y) : (y+z)$  is

- (A)  $\frac{2}{3}$     (B)  $\frac{1}{2}$     (C)  $\frac{3}{4}$     (D)  $\frac{1}{4}$

- ( )11. Let  $x, y$  are not  $= 0$ , and  $3x=5y$ , the ratio of  $(x-y) : (x+y)$  is  
 (A)  $\frac{2}{5}$  (B)  $\frac{1}{2}$   
 (C)  $\frac{1}{3}$  (D)  $\frac{1}{4}$
- ( )12. As shown the four points  $A, B, C, D$  are collinear, and  $\overline{AB} : \overline{BC} : \overline{CD} = 4 : 5 : 6$ , if  $M, N$  are the midpoints of that  $\overline{AB}, \overline{CD}$  respectively, and  $\overline{MN}=5$ , then  $\overline{AD} =$   
 (A) 8.5  
 (B) 8  
 (C) 7.5  
 (D) 7
- 
- ( )13. If  $2x : y = 4 : 5$ , and  $y : 3z = 1 : 9$ , then  $\frac{z}{x+y} = ?$   
 (A)  $\frac{5}{2}$  (B)  $\frac{15}{7}$   
 (C) 1 (D) 2
- ( )14. Let  $x$  be inversely proportional to  $y$ , and  $x=3, y=-10$ , then the relationship between  $x$  and  $y$  is  
 (A)  $xy = -30$   
 (B)  $xy = 30$   
 (C)  $xy = -10$   
 (D)  $xy = 10$
- ( )15.  $y$  is not a function of  $x$  in which of the following statement?  
 (A) Sister's weight is  $x$  kg, can be changed to  $y$  pounds to represent  
 (B) Distance fixed, the travel time is  $x$  and the rate  $y$   
 (C) Student ID number  $x$  of students, math final test score is  $y$   
 (D) In the year, the number of days in the  $y^{\text{th}}$  months is  $x$  days

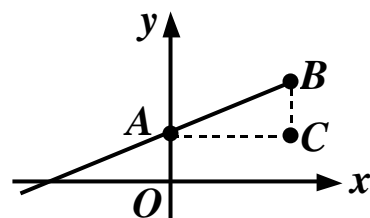
- ( )16. The graph of a known function  $f(x) = -5x + k$  is passed through  $(-1, 6)$ , then  $k =$   
 (A) 1 (B)  $-1$   
 (C) 11 (D)  $-11$
- ( )17. If  $ab < 0$ , then  $(a, b)$  will fall in which quadrant?  
 (A) First quadrant or Fourth quadrant  
 (B) Second quadrant or Fourth quadrant  
 (C) Third quadrant or Fourth quadrant  
 (D) First quadrant or Third quadrant
- ( )18. There are three points  $A, B, C$  on the plane rectangular coordinate system, the coordinates are  $(1, 2), (7, 2), (1, 8)$ , then  $\triangle ABC$  is  
 (A) Regular triangle  
 (B) Acute triangle  
 (C) Obtuse triangle  
 (D) Isosceles right triangle
- ( )19. The graph of the linear function  $f(x) = (a+5)x - (a+10)$  is a straight line parallel to the  $x$ -axis, then  $f(\frac{23}{45}) =$   
 (A)  $-\frac{23}{9}$  (B)  $\frac{23}{9}$   
 (C)  $-5$  (D)  $5$
- ( )20. It is known that  $A(0,0), B(9,0), C(x,y)$  are three points on the coordinate plane, where the point  $C$  is in the third quadrant, if the area of  $\triangle ABC$  is 18, find the  $y$  coordinate of point  $C$ ?  
 (A)  $-3$  (B)  $-4$   
 (C)  $-5$  (D)  $-6$

( )21. On a rectangular coordinate plane, lies equation  $3x-5y=15$ ,  $x+5y=5$ ; what is the length of the  $y$ -axis that encloses this triangle?

- (A) 10            (B) 8  
(C) 12            (D) 20

( )22. As shown,  $\overline{BC}$  parallel to the  $y$ -axis,  $\overline{AC}$  is parallel to the  $x$ -axis, and  $\overline{AC}=9$ , if through points  $A, B$ , the linear equation is  $x-3y+9=0$ , then  $\overline{BC} =$

- (A) 2  
(B) 3  
(C) 4  
(D) 5



( )23. Which of the following inequality is correct?

- (A)  $14 + (-22) \geq -7$   
(B)  $0 - (-3) > 3$   
(C)  $(-8) - (-9) \leq 1$   
(D)  $6 \times (-5) > -30$

( )24. It is known that  $P(x)$  is a point on the number line, and  $x$  satisfies the inequalities  $x+1 \leq 5$  and  $x-1 > 0$ , which of the following statement is correct?

- (A) Point  $P$  must be on the left side of the origin  
(B)  $x < 1$   
(C)  $x > 5$   
(D) The maximum value of  $x$  is 4

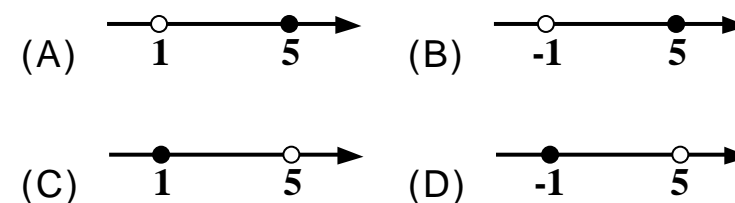
( )25. If  $x$  is an integer, and satisfies  $5x+21 \geq 0$  and  $3x-2 < -3$ , how many solutions are there?

- (A) 6            (B) 5  
(C) 4            (D) 3

( )26. If  $a > b > 0$ , of  $4a$  and  $\frac{16a+b}{4}$  which one is larger?

- (A)  $4a$   
(B)  $\frac{16a+b}{4}$   
(C) the same  
(D) cannot compare

( )27. The solution of  $2x-3 \leq 7 < 3x+4$ , on the number line is

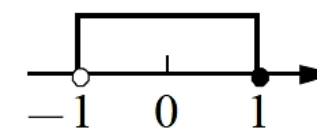


( )28. The solution of Inequality  $|2x-3| \leq 5$  is how many units on the number line?

- (A) 5 units  
(B) 2 units  
(C) 3 units  
(D) 4 units

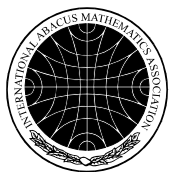
( )29. As shown in the figure, which of the following inequality is illustrated?

- (A)  $0 < x-1 \leq 1$   
(B)  $-1 < x+2 \leq 1$   
(C)  $1 < x+1 \leq 2$   
(D)  $0 < x+1 \leq 2$



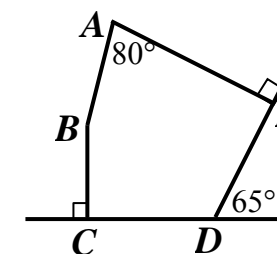
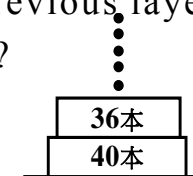
( )30. An integer  $x$  satisfies the inequality  $0 < |x-1| < 4$ , what is the value of  $x$ ?

- (A) 5            (B) 6  
(C) 7            (D) 4

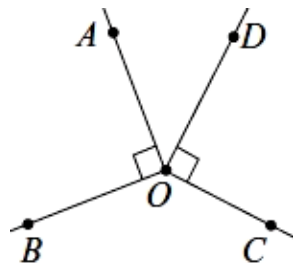


- ( )1. Find the pattern of following sequence of numbers,  
 $-1, 2, -3, 4, -5, \square, -7, \square =$   
 (A) 6 (B) 5.5  
 (C)  $-6$  (D)  $-5.5$
- ( )2. An arithmetic sequence  $a_{10}$  is  $-18$ , common difference is  $3$ , find  $31^{\text{th}}$  term of this arithmetic sequence.  
 (A) 13 (B) 28  
 (C) 31 (D) 45
- ( )3. Let  $f(x) = 3x - 1$ , if  $f(2), f(a), f(b), f(16)$  to the arithmetic sequence, what is the arithmetic mean  $a$  and  $b$ ?  
 (A) 18 (B) 26  
 (C) 30 (D) 44
- ( )4. Three numbers form an arithmetic sequence, sum is  $315$ , and the ratio of the first number to the third number is  $2 : 8$ , What is the third number?  
 (A) 117  
 (B) 155  
 (C) 168  
 (D) 134
- ( )5. There are three internal angles of a triangle that form an arithmetic sequence, which could be an interior angle?  
 (A)  $15^\circ$  (B)  $90^\circ$   
 (C)  $30^\circ$  (D)  $60^\circ$

- ( )6. John wants to make a bookshelf to store a total of  $180$  books. If each shelf has  $4$  books less than the previous layer, and how many shelves will the bookshelf have?  
 (A) 9 layers (B) 8 layers  
 (C) 7 layers (D) 6 layers
- ( )7. Each row has  $2$  more seats than the previous row, if the theater has a total of  $266$  seats and the last row has  $32$  seats, how many rows are there?  
 (A) 12 rows (B) 13 rows (C) 14 rows (D) 15 rows
- ( )8. With regards the interior angle and exterior angle of a regular octagon, which of the following is correct?  
 (A) Sum of interior angle is 4 times sum of exterior angle.  
 (B) Difference between sum of interior angle and sum of exterior angle is  $540^\circ$   
 (C) Sum of interior angle plus sum of exterior angle is  $8 \times 180^\circ$   
 (D) Each interior angle is 5 times each exterior angle.
- ( )9. Of the three exterior angles of a triangle, there is an angle equal to  $130^\circ$ , which of the following degrees cannot be one of the other exterior angles?  
 (A)  $50^\circ$  (B)  $60^\circ$  (C)  $70^\circ$  (D)  $80^\circ$
- ( )10. As shown, in the pentagon  $ABCDE$ , the exterior angle of  $\angle C$  and  $\angle E$  are right angles, the exterior angle of  $\angle D$  is  $65^\circ$ ,  $\angle A = 80^\circ$ , then  $\angle B = ?$   
 (A)  $160^\circ$   
 (B)  $165^\circ$   
 (C)  $170^\circ$   
 (D)  $175^\circ$

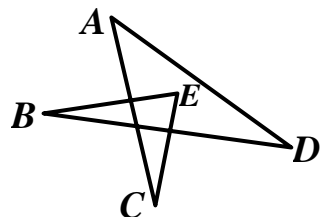


- ( )11. As shown, known  $\overline{OA} \perp \overline{OB}$ ,  $\overline{OC} \perp \overline{OD}$ , and  $\angle AOD=55^\circ$ , find  $\angle BOC=?$



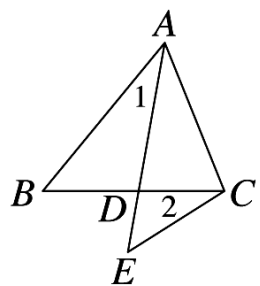
- (A)  $115^\circ$   
 (B)  $120^\circ$   
 (C)  $130^\circ$   
 (D)  $125^\circ$

- ( )12. As shown,  $\angle A=40^\circ$ ,  $\angle B=20^\circ$ ,  $\angle D=30^\circ$ ,  $\angle E=60^\circ$ , then  $\angle C=?$



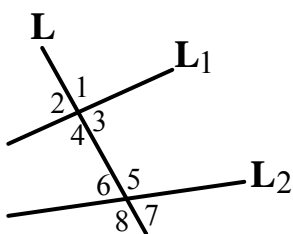
- (A)  $10^\circ$   
 (B)  $20^\circ$   
 (C)  $30^\circ$   
 (D)  $40^\circ$

- ( )13. As shown,  $\angle ADC=75^\circ$ , find  $\angle 1+\angle 2+\angle B+\angle E=?$



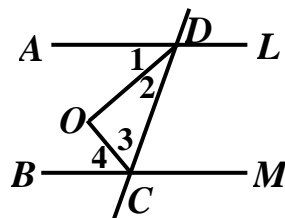
- (A)  $150^\circ$   
 (B)  $155^\circ$   
 (C)  $160^\circ$   
 (D)  $165^\circ$

- ( )14. As shown,  $\angle 1$  and  $\angle 5$  are



- (A) interior angles on the same side  
 (B) corresponding angles  
 (C) alternate interior angles  
 (D) alternate exterior angles

- ( )15. As shown, if  $L \parallel M$ ,  $\overline{OD}$  and  $\overline{OC}$  were bisector of  $\angle ADC$  and  $\angle BCD$ , then  $\angle DOC=?$



- (A)  $100^\circ$   
 (B)  $95^\circ$   
 (C)  $90^\circ$   
 (D)  $80^\circ$

- ( )16. If  $\triangle ABC \cong \triangle FED$ , and  $\triangle EFD \cong \triangle MNP$ , then  $\triangle ABC=?$

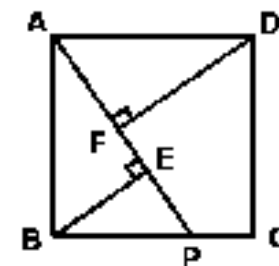
- (A)  $\triangle PNM$       (B)  $\triangle NMP$   
 (C)  $\triangle PMN$       (D)  $\triangle NPM$

- ( )17. In the  $\triangle ABC$  and  $\triangle DEF$   $\overline{AB} = \overline{DF}$ ,  $\overline{BC} = \overline{DE}$ . Which of the following conditions allow these two triangles to be Identical?

- (A)  $\angle B = \angle D$       (B)  $\angle B = \angle F$   
 (C)  $\angle C = \angle E$       (D)  $\angle A = \angle F$

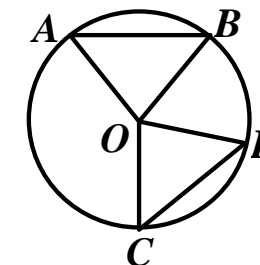
- ( )18.  $ABCD$  is a square, the side length is 10 cm, take a point  $P$  on the side  $\overline{BC}$ , draw  $\overline{AP}$ , and then from  $B$  and  $D$ , draw two points  $\overline{BE} \perp \overline{AP}$  in  $E$ ,  $\overline{DF} \perp \overline{AP}$  in  $F$ , if  $\overline{BE} = 6 \text{ cm}$ , then  $\overline{FE} =$

- (A) 1 cm  
 (B) 2 cm  
 (C) 3 cm  
 (D) 4 cm



- ( )19. As shown,  $\overline{AB}$ ,  $\overline{CD}$  are two chords of the circle  $O$ ,  $\overline{AB} = \overline{CD}$ , according to which of congruence property, such that  $\triangle AOB = \triangle COD$ .

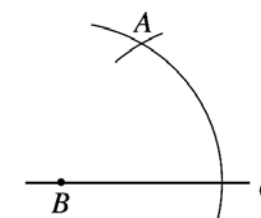
- (A) ASA  
 (B) SSA  
 (C) SSS  
 (D) SAS



- ( )20. There are two points  $A$  and  $B$ , if  $B$  is the center of the circle and  $\overline{AB}$  is the radius of an arc, which of the following statement is correct?

- (A)  $\overline{AC} = \overline{BC}$   
 (B)  $\overline{AB} = \overline{BC}$   
 (C)  $\overline{AB} = \overline{AC}$

- (D) loss of judgment



( )21. An angle is  $90^\circ$ . With a ruler and a compass, how many angular bisectors will you need to construct if the other angles are  $78.75^\circ$  and  $11.25^\circ$ ?

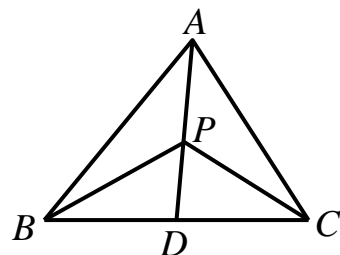
- (A) 1 time            (B) 2 times  
(C) 3 times            (D) 4 times

( )22. in  $\triangle ABC$ , known  $\overline{AB} = 1$ ,  $\overline{BC} = 3 - \sqrt{2}$ ,  $\overline{AC} = 3 - \sqrt{3}$  are three internal angle, which is the smallest?

- (A)  $\angle A$   
(B)  $\angle B$   
(C)  $\angle C$   
(D) cannot compare

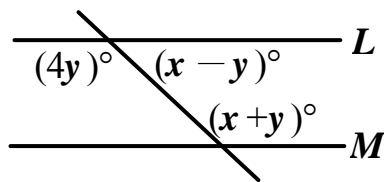
( )23. As shown, in  $\triangle ABC$ ,  $\angle B < \angle C$ ,  $D$  is the midpoint of  $\overline{BC}$ ,  $P$  is a point on  $\overline{AD}$ , then

- (A)  $\overline{PB} > \overline{PC}$   
(B)  $\overline{PB} < \overline{PA}$   
(C)  $\overline{AB} < \overline{BC}$   
(D)  $\angle ADB < \angle ADC$



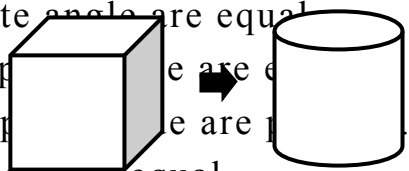
( )24. Find the value of  $x$  and  $y$ , such that  $L \parallel M$ .

- (A)  $x=80^\circ$ ,  $y=30^\circ$   
(B)  $x=90^\circ$ ,  $y=30^\circ$   
(C)  $x=90^\circ$ ,  $y=40^\circ$   
(D)  $x=95^\circ$ ,  $y=40^\circ$



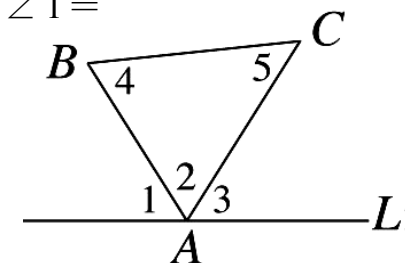
( )25. Which of the following cannot prove that the quadrilateral is a parallelogram?

- (A) Two groups of opposite angle are equal  
(B) Two groups of opposite side are equal  
(C) Two groups of opposite side are parallel  
(D) A group opposite side is equal, the other group opposite side is parallel.



( )26. As shown,  $\triangle ABC$  cross line  $L_1$  at point  $A$ , and  $\angle 1 = \angle 3$ ,  $\angle 4 = 66^\circ$ ,  $\angle 5 = 50^\circ$ , then  $\angle 1 =$

- (A)  $56^\circ$   
(B)  $58^\circ$   
(C)  $60^\circ$   
(D)  $62^\circ$

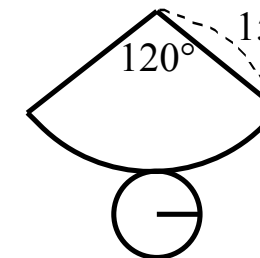


( )27. Connect the midpoints of a four-sided kite to form a

- (A) rhombus            (B) rectangle  
(C) square            (D) parallelogram

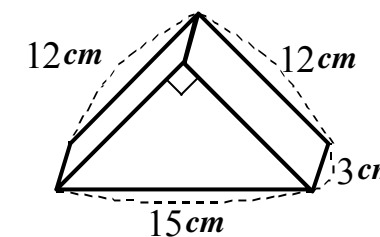
( )28. With the information given in the figure, what is the circumference of the fan shaped figure?

- (A)  $8\pi$   
(B)  $15\pi$   
(C)  $12\pi$   
(D)  $10\pi$



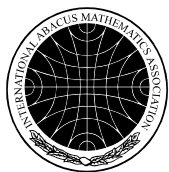
( )29. As shown, find the surface area of the isosceles right triangle prism?

- (A)  $201 \text{ cm}^2$   
(B)  $216 \text{ cm}^2$   
(C)  $261 \text{ cm}^2$   
(D)  $285 \text{ cm}^2$



( )30. As shown, there is a cube with side lengths which are 5 cm. If you cut out one cylinder from the cube, what is maximum volume of this cylinder?

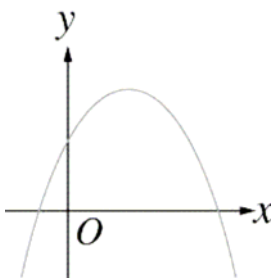
- (A)  $31.25 \pi \text{ cm}^3$   
(B)  $45.5 \pi \text{ cm}^3$   
(C)  $50.25 \pi \text{ cm}^3$   
(D)  $62.5 \pi \text{ cm}^3$



Student ID. \_\_\_\_\_

The Ninth Grade Set 1

Time Allowed :15 minutes

- ( )1. There are 10 balls in the box, marked with number 1, 2, ..., 10, respectively. If you remove a ball with the number  $Z$ , what is the probability that the number  $Z-4$  is positive or  $Z-8$  is negative?  
 (A)  $\frac{1}{5}$  (B)  $\frac{2}{5}$  (C)  $\frac{3}{10}$  (D)  $\frac{1}{2}$
- ( )2. As shown, which of the following quadratic functions is shown?  
 (A)  $y=-(x-4)^2+7$   
 (B)  $y=-(x-2)^2+7$   
 (C)  $y=-(x-3)^2+9$   
 (D)  $y=-(x-5)^2$
- 
- ( )3. If the vertex of the parabolic equation  $y=-x^2-2x+15$  is A, this parabola intersects the  $x$ -axis at B and C, then  $\triangle ABC$  area =  
 (A) 56  
 (B) 60  
 (C) 64  
 (D) 68
- ( )4. Throwing two dice at the same time, what is the probability of both dice having odd numbers?  
 (A)  $\frac{1}{6}$  (B)  $\frac{1}{2}$  (C)  $\frac{1}{3}$  (D)  $\frac{1}{4}$
- ( )5. If the product of two numbers is 45, the arithmetic mean between the two numbers is  $-7$ , what is the smaller of these two numbers?  
 (A)  $-9$  (B)  $-8$  (C)  $-7$  (D)  $-5$
- ( )6. There are three quadratic functions, A:  $y=x^2$ , B:  $y=x^2+2x-1$ , C:  $y=-x^2$ , if the three graphs are appropriately moved in parallel, which graphs can overlap?  
 (A) only A, B (B) only A, C  
 (C) only B, C (D) A, B, C
- ( )7. There are 100 balls in the box, respectively marked with number 1, 2, ..., 100. Find the probability of removing a ball where the number is a multiple of 8?  
 (A)  $\frac{2}{25}$  (B)  $\frac{3}{25}$  (C)  $\frac{4}{25}$  (D)  $\frac{5}{25}$
- ( )8. Throwing two dice twice, what is the probability that the numbers will be the same?  
 (A)  $\frac{1}{6}$  (B)  $\frac{1}{5}$  (C)  $\frac{1}{3}$  (D)  $\frac{1}{4}$
- ( )9. The semester math test results, the lowest score is 35 points, the highest score is 99 points, arithmetic mean is 72 points. because there was a question with a mistake, each student received 5 more points and the lowest score become 40 points. Find the new arithmetic mean of the math test results?  
 (A) 75 points (B) 76 points  
 (C) 77 points (D) 78 points
- ( )10. When drawing a line chart to represent the heights of the students in a class, there are 7 people with heights of 165~170 cm, the coordinates of the point are  
 (A) (170, 7) (B) (165, 7)  
 (C) (165, 170) (D) (167.5, 7)



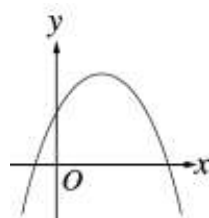
- ( )11. A math class has 24 students who passed with an average of 73 points on the last math test. Of the 6 people who failed, they had an average is 58 points. What is the average of the whole class?  
(A) 68 points      (B) 69 points  
(C) 70 points      (D) 71 points
- ( )12. The total number of candidates registered for a national examination is 128,500 people. A total of 75,815 people attended the examination and 6,425 people were absent, what is the attendance rate excluding the absentees?  
(A) 65%      (B) 62%      (C) 63%      (D) 64%
- ( )13. In the following quadratic functions, which graphic is always below the  $x$  axis?  
(A)  $y = -x$   
(B)  $y = -x^2 + 1$   
(C)  $y = x^2 - 3$   
(D)  $y = -x^2 - 1$
- ( )14. A data group has 10 numbers, arranged from small to large are A, B, C, ..., J; If the sum is 300 and the numbers are evenly spaced out, the median of this data group is  
(A) 15      (B) 30  
(C) 20      (D) 40
- ( )15. There are various types of statistics charts. What kind of statistics chart is commonly used to indicate the number of various types of proportions of totals in addition to comparison of size?  
(A) pie chart      (B) line chart  
(C) histogram      (D) bar chart
- ( )16. If there is no relationship between the various types of statistics, and we want to compare them, which of the following statistic chart is required?  
(A) bar chart      (B) histogram  
(C) line chart      (D) pie chart
- ( )17. There are three kinds of Data A, B, C: Data A makes  $\frac{3}{10}$ , Data B makes  $\frac{5}{12}$ , the rest is the Data C, the number of Data C is 527, if the number of each data is drawn into a pie chart, what is the degree of the central angle of Data B?  
(A)  $130^\circ$       (B)  $150^\circ$   
(C)  $180^\circ$       (D)  $210^\circ$
- ( )18. It is known that the number of family members of 10 students in David's class is : 11, 3, 9, 4, 3, 5, 3, 7, 3, 5. Which of the following statement is correct?  
(A) Mode is 11 members.  
(B) Median is 4.5 members.  
(C) Arithmetic mean is 5 members.  
(D) Arithmetic mean+Mode+Median=20.5 members.
- ( )19. A and B take a trip. There are 3 cars for them to choose them to take the ride. What is the probability of A and B choosing the same car?  
(A)  $\frac{1}{9}$       (B)  $\frac{1}{6}$       (C)  $\frac{1}{3}$       (D)  $\frac{1}{2}$
- ( )20. A basketball team has eight students, the number of their brothers and sisters are 2, 3, 5, 4, 1, 0, 7, 2. if the arithmetic mean is  $a$ , the Median is  $b$ , the Mode is  $c$ , what is the value of  $a+c-2b$ ?  
(A) 3      (B) 2  
(C) 1      (D) 0

( )21. There are 30 balls in the box, respectively marked with number 1, 2, ... , 30. If a ball removed has the number  $Z$ , what is the probability that the number is not a multiple of 3 and multiple of 5?

- (A)  $\frac{8}{15}$  (B)  $\frac{1}{2}$  (C)  $\frac{2}{3}$  (D)  $\frac{3}{5}$

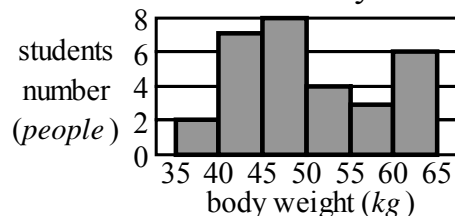
( )22. If  $a, b, c$  is a known number, quadratic function  $y = ax^2 + bx + c$  graphics as shown below, let  $D = b^2 - 4ac$ , which of the following is correct?

- (A)  $D > 0, a > 0$   
 (B)  $D < 0, C < 0$   
 (C)  $a > 0, c > 0$   
 (D)  $a < 0, c > 0$



( )23. There is bar chart showing the body weights of 40 students. What is the arithmetic mean of all the students' body weight? (round off to 1 kg)

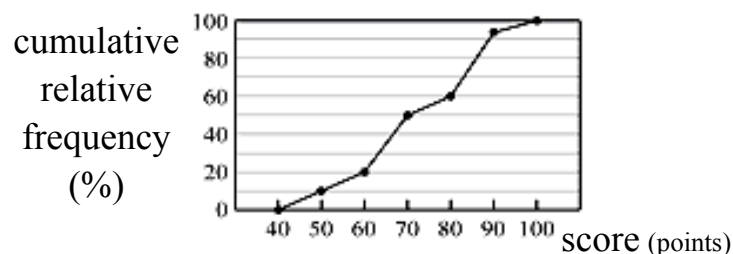
- (A) 49 kg (B) 50 kg  
 (C) 51 kg (D) 52 kg



( )24. Which of the following statement is correct?  
 (A) Mode is the largest number in the data group.  
 (B) Mode may have two in the data group.  
 (C) Mode does not affect the average of the data group.  
 (D) Mode value are the same as Median value in the data group.

( )25. As shown, the line chart of a class math test results, then how many what is the proportion with a percentage of 90 points or more and less than 60 points?

- (A) 20%  
 (B) 10%  
 (C) 30%  
 (D) 15%

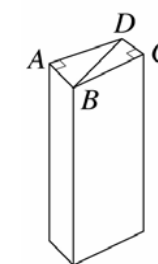


( )26. There are 50 balls in the box, respectively marked with number 1, 2, ... , 50. If you remove a ball from the box and read the marked number, then put it back into the box, and if every ball has the same opportunity to be taken out over 50 consecutive moves, you may fail to take out the ball marked as 50?

- (A) possible (B) impossible  
 (C) not necessarily (D) none of above

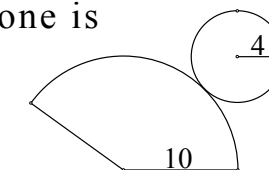
( )27. A rectangular prism is 15 cm high and the measurements of  $\overline{AB} = 4$  cm,  $\overline{BC} = 8$  cm,  $\overline{CD} = 3$  cm,  $\overline{AD} = 7$  cm,  $\overline{BD} = 10$  cm. What is the volume of rectangular prism?

- (A)  $280 \text{ cm}^3$   
 (B)  $360 \text{ cm}^3$   
 (C)  $390 \text{ cm}^3$   
 (D)  $480 \text{ cm}^3$



( )28. If a segment of a cone has a radius of 10 cm and an arc equivalent to the circumference of a circle which has a radius of 4 cm, the surface area of the cone is

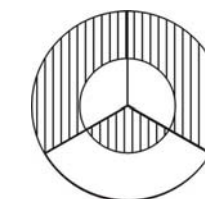
- (A)  $28\pi \text{ cm}^2$  (B)  $36\pi \text{ cm}^2$   
 (C)  $48\pi \text{ cm}^2$  (D)  $56\pi \text{ cm}^2$

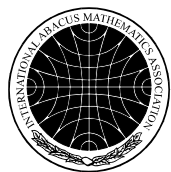


( )29. The body weights of ten students are 26, 34, 32, 33, 29, 27, 30, 35, 37, 47 kg. the arithmetic mean of their body weights is  
 (A) 31.5 kg (B) 33 kg (C) 32.5 kg (D) 34 kg

( )30. As shown, there is a concentric circle dart board, radius ratio is 1:2, the central angle of each circular sector is  $120^\circ$ , if you throw a dart and hit the dart board, the probability of the dart hitting the slant line area is

- (A)  $\frac{5}{12}$  (B)  $\frac{1}{2}$   
 (C)  $\frac{1}{3}$  (D)  $\frac{7}{12}$





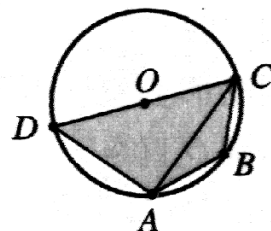
Student ID. \_\_\_\_\_

The Seventh Grade Set 2

Time Allowed :3 minutes

( )1. As shown, isosceles  $\triangle ABC$ 's vertices are on the circle,  $\overline{AB} = \overline{BC}$ , if  $\overline{CD}$  is diameter of circle  $O$ ,  $\angle DCA=38^\circ$ , find  $\angle D=?$

- (A)  $52^\circ$
- (B)  $38^\circ$
- (C)  $72^\circ$
- (D)  $104^\circ$



( )2. Which of the following quadrilaterals has a diagonal line that must be equal and bisect each other?

- (A) parallelogram
- (B) isosceles trapezoid
- (C) rectangle
- (D) rhombus

( )3. There is an arithmetic sequence 1,4,7,10,13. Each number will be multiplied by 3 plus 2 to form a new series. To describe the new sequence, which of the following is correct?

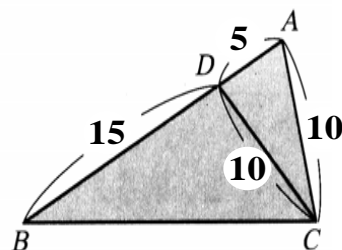
- (A) The new sequence is not an arithmetic sequence
- (B) It's arithmetic sequence, the difference between two term is 3
- (C) It's arithmetic sequence, the difference between two term is 6
- (D) It's arithmetic sequence, the difference between two term is 9

( )4. If there are eight points on each side of a regular hexagon (including vertices), what is the total number of points on all sides of the regular hexagon?

- (A) 48 points
- (B) 42 points
- (C) 40 points
- (D) 32 points

( )5. As shown,  $\triangle ABC$  is an enlarged version of the  $\triangle ADC$ , find  $\overline{BC}=?$

- (A) 15
- (B) 18
- (C) 20
- (D) 22



( )6. Mom paid 1,000 dollars which is 70% of the original price, to buy a pair of shoes. If the change is 342 dollars, what is the original price of this pair of shoes?

- (A) 980 dollars
- (B) 940 dollars
- (C) 838 dollars
- (D) 742 dollars

( )7. John bought a pair of pants at 70% of the original price. John sees that the price tagged on the pants is 273 dollars. So, how much is the original price?

- (A) 350 dollars
- (B) 360 dollars
- (C) 380 dollars
- (D) 390 dollars

( )8. Which of the following option has proportional corresponding sides and corresponding angles which are equal?

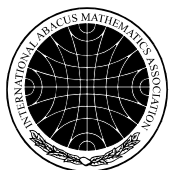
- (A) two isosceles right triangle
- (B) two parallelogram
- (C) square and rectangle
- (D) square and rhombus

( )9. A concave quadrilateral has, at most, A obtuse angle, a convex quadrilateral has, at most, B obtuse angles, then  $A + B=?$

- (A) 3
- (B) 4
- (C) 5
- (D) 6

( )10. There is a trapezoidal prism. The trapezoid topline is 8 cm, the baseline is 15 cm, the height is 10 cm. If the volume of a the trapezoidal prism is  $2070 \text{ cm}^3$ , how many cm is the height of the trapezoidal prism?

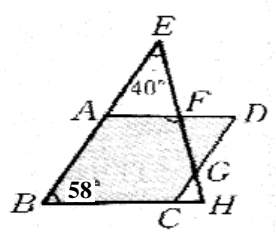
- (A) 6 cm
- (B) 12 cm
- (C) 18 cm
- (D) 24 cm

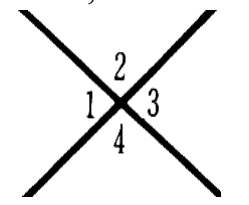


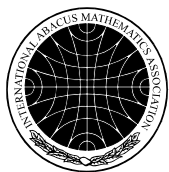
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The Eighth Grade Set 2

Time Allowed :3 minutes

- ( )1. The value of the quadratic function  $y=2x^2-4x+7$  is  
 (A) always greater than 7  
 (B) never less than 5  
 (C) always greater than 6  
 (D) always less than 4
- ( )2. Connect two ends of a chord in a circle to the center of the circle and that will form a triangle. The triangle must be  
 (A) a regular triangle  
 (B) an acute triangle  
 (C) a right triangle  
 (D) an isosceles triangle
- ( )3. As shown, in the parallelogram  $ABCD$ ,  $\overline{EH}$  respectively intersects  $\overline{AD}$ ,  $\overline{CD}$  in  $F$ ,  $G$ , and  $\angle B=58^\circ$ ,  $\angle E=40^\circ$ , then  $\angle AFH=?$   
 (A)  $40^\circ$   
 (B)  $58^\circ$   
 (C)  $98^\circ$   
 (D)  $102^\circ$
- 
- ( )4. There is a  $N$  sided polygon. If the sum of interior angle is equal to 4 times the sum of exterior angle, then  $N=?$   
 (A) 6 (B) 8  
 (C) 10 (D) 12
- ( )5. If  $\triangle ABC \cong \triangle XYZ$ , which of the following statement is wrong?  
 (A)  $\overline{AB} \cong \overline{XZ}$  (B)  $\overline{BC} \cong \overline{YZ}$   
 (C)  $\angle A = \angle X$  (D)  $\angle C = \angle Z$

- ( )6. It is known that the ratio of the three interior angles of a triangle is 4: 5: 6, Find the maximum interior angle?  
 (A)  $72^\circ$  (B)  $75^\circ$  (C)  $80^\circ$  (D)  $84^\circ$
- ( )7. As shown, two straight lines intersect at one point, forming four angles, sequentially as  $\angle 1$ ,  $\angle 2$ ,  $\angle 3$ ,  $\angle 4$ , if  $3\angle 1+2\angle 3=325^\circ$ , then  $\angle 2=?$   
 (A)  $65^\circ$  (B)  $110^\circ$   
 (C)  $115^\circ$  (D)  $120^\circ$
- 
- ( )8. Observe graphical relationship of the two parabolic  $y=2(x+3)^2+6$  and  $y=-2x^2-11x-12$ , which of the following statement is correct?  
 (A) The opening direction is not the same  
 (B) They may be overlapped by appropriate parallel movement  
 (C) Axis of symmetry is the same  
 (D) The vertices are not the same
- ( )9. Two identical equilateral triangles may be combined into a  
 (A) rectangle (B) square  
 (C) trapezoid (D) rhombus or parallelogram
- ( )10. Which of the following statement is wrong?  
 (A) With two sides and an included angle of a triangle, only one kind of the triangle can be made  
 (B) With the three interior angles of a triangle, only one kind of the triangle can be made  
 (C) With two sides and an included side of a triangle, only one kind of the triangle can be made  
 (D) With the three sides of a triangle, only one kind of the triangle can be made



- ( )1. Known arithmetic sequence is  $4, 3\frac{2}{3}, 3\frac{1}{3}, 3, \dots$ . Which is the first term to have a negative number?  
 (A) 13rd term  
 (B) 14th term  
 (C) 15th term  
 (D) 16th term
- ( )2. David bought a new car at the beginning of the year, priced at 650,000 dollars, the depreciation rate for the first year is 20%. After that the annual depreciation rate is 10% of the previous year's price. How much is the value of the car at the beginning of the fourth year?  
 (A) 362880 dollars (B) 416000 dollars  
 (C) 473850 dollars (D) 421200 dollars
- ( )3. It is known that common ratio of the geometric series is 3, the sum of the term 1 to term 8 is 9840, find term 8?  
 (A) 6561 (B) 6400 (C) 5983 (D) 5862
- ( )4. If the probability of birth of boys and girls is equal, then what is the probability of a family with two children to have a boy and a girl?  
 (A)  $\frac{1}{5}$  (B)  $\frac{1}{2}$  (C)  $\frac{1}{3}$  (D)  $\frac{1}{4}$
- ( )5. Throwing a coin and a dice at the same time, what is the probability of the coin being tails and the dice showing a prime numbers?  
 (A)  $\frac{1}{2}$  (B)  $\frac{1}{3}$  (C)  $\frac{1}{4}$  (D)  $\frac{1}{6}$
- ( )6. There are 15 positive numbers arranged from small to large:  $1, 1, 2, 3, a, a, b, b, c, c, c, 9, 11, 11, 12$ . if the Median of the 15 positive numbers is 6, Mode is 7, arithmetic mean is 6, then  $a=?$   
 (A) 3.5 (B) 4 (C) 4.5 (D) 5
- ( )7. There are 100 balls in the box, respectively marked with numbers  $1, 2, \dots, 100$ . What is the probability of removing a ball with a number that is a multiple of 4?  
 (A)  $\frac{1}{2}$  (B)  $\frac{1}{3}$  (C)  $\frac{1}{4}$  (D)  $\frac{1}{5}$
- ( )8. The first term of the known arithmetic series is 36, the last term is  $-18$ , sum is 90, the number of terms is  $n$ , common difference is  $d$ , then  $n+d=?$   
 (A) 3 (B) 4 (C) 5 (D) 6
- ( )9. A school carnival starts from 11 am to 4 pm. After it ended, a class drew a pie chart to show the income from the carnival (see diagram). Find  $\angle BOC=?$   
 (A)  $75^\circ$   
 (B)  $65^\circ$   
 (C)  $55^\circ$   
 (D)  $50^\circ$
- ( )10. If the numbers 1, 2, and 3 are to be arranged into three-digit numbers, what is the probability that these three-digit numbers are even?  
 (A)  $\frac{4}{9}$  (B)  $\frac{1}{6}$  (C)  $\frac{2}{3}$  (D)  $\frac{1}{3}$

