

## Tuqiao School District 2017-2018 Final 7th grade Math Exam

### Test A (full score 100 points)

One, multiple choice (10 questions, 3 points per question, full score 30 points)

1. 7 has an opposite number of ( )

A 、 7      B 、 - 7      C 、 + 7 or - 7      D 、 0 and 7

2.  $(-1)^{2011} = ( )$

A 、 -1      B 、 1      C 、 2011      D 、 -2011

3. 591000000 written in scientific notation is ( )

A.  $0.591 \times 10^9$     B.  $59.1 \times 10^7$     C.  $5.91 \times 10^7$     D.  $5.91 \times 10^8$

4. Which one of the equations is valid? ( )

A .  $-3 - 2 = -1$     B .  $-3^2 = 8$     C .  $2xy + xy = 3xy$     D .  $2x + x^2 = 3x^3$

5. There is a two-digit number. In the ones place there is the digit  $x$ , in the tens place  $y$ . Use an algebraic expression to express the value of this two-digit number. ( )

A 、  $xy$       B 、  $yx$       C 、  $10x + y$       D 、  $10y + x$

6. A coat with a price of \$600 can still make a profit of \$20 at a 20% discount. Let the cost price of this coat be  $x$  dollars. The correct equation listed below is ( )

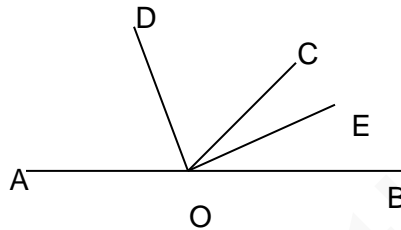
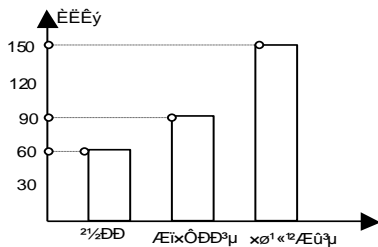
A.  $600 \times 8 - x = 20$       B.  $600 \times 0.8 + x = 20$

C.  $600 \times 8 + x = 20$       D.  $600 \times 0.8 - x = 20$

7. Based on the following bar graph, which of the following statements is correct? ( )

( A ) 50 participants walked ( B ) The number of walkers and cyclists is less than the number of people who take the bus

( C ) 50% of the participants took the bus ( D ) There were at least 90 participants that walked

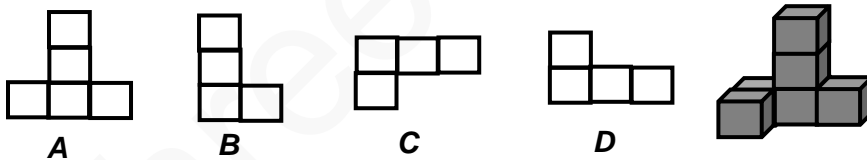


8. As shown in the figure above,  $\angle AOB = 180^\circ$ . OD and OE are each the bisectors of  $\angle AOC$  and  $\angle BOC$ .

Which line is perpendicular to OD? ( )

A 、 OA      B 、 OC      C 、 OE      D 、 OB

9. The view from the right side of the figures is ( )



10. How many of the systems of equations are correct? ( )

(1)  $3+x=5$ ,  $x=5+3$ ; (2)  $7x=-4$ ,  $x=-\frac{7}{4}$ ;

(3)  $\frac{1}{2}y=0$ ,  $y=2$ ; (4)  $3=x-2$ ,  $x=-2-3$ ;

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

Two, fill in the blanks (5 questions, 3 points per question, full score 15 points)

11. The number represented by a point 2 units long from -1.5 on the number line is \_\_\_\_.

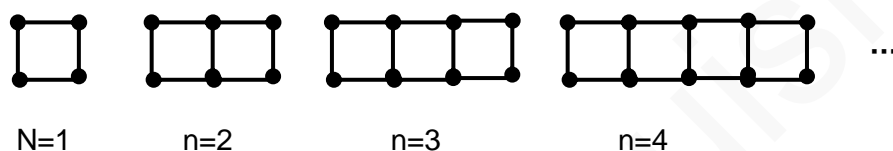
12. The linear function(s) from the following are ①  $x + 2y = 3$ , ②  $\frac{1}{x} - 3x = 9$ , ③  $\frac{y-2}{3} = y + \frac{1}{3}$ ,

④  $\frac{1}{2}x = 0$ , \_\_\_\_\_.

13. Positive rational numbers  $a$  and  $b$  satisfy the following:  $a \otimes b = \frac{ab}{a+b}$ , then  $8 \otimes 6 =$  \_\_\_\_.

14. At 6:30, the acute angle between the minute and hour hand is \_\_\_\_.

15. As shown, matches are used to create squares. In the  $n$ th figure, there will be \_\_\_\_ sticks.



Three, calculation (3 questions, 7 points per question, full score 21 points)

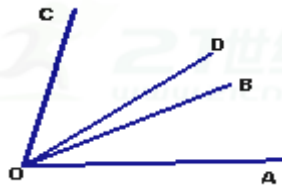
16. ( 1 ) Calculate:  $-2^3 + [18 - (-3) \times 2] \div 4$

( 2 ) Simplify, and then substitute:  $2(3x^2 - 5y) - [-3(x^2 - 3y)]$ , among them  $x = \frac{1}{3}$ ,  $y = -2$

(3) Solve for x:  $\frac{x-6}{4} - x = \frac{x+5}{2}$

Four, short answer questions (2 questions, 8 points per question, full score 16 points)

17. As shown, it is given that  $\angle BOC = 2\angle AOB$ , OD bisects  $\angle AOC$ ,  $\angle BOD = 14^\circ$ , find the measure of  $\angle AOB$ .



18. In order to understand the situation of students participating in sports activities, the school conducts a random sample survey of students. One of the questions is "How much time do you participate in sports activities every day on average?" There are 4 options: (A) 1.5+ hours (B) 1 ~ 1.5 hours (C) 0.5—1 hours (D) 0.5- hours

Data in 1 and 2 are information given from the results.



Figure 1

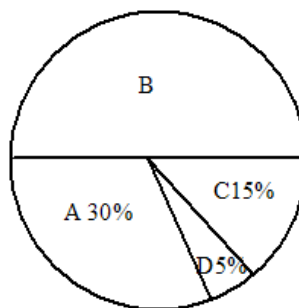


Figure 2

Answer the following questions:

- (1) How many students participated in this survey?      (2) In figure 1, fill out the column for B;
- (3) If there is a total of 3000 students in the school, approximately how many students spend less than 0.5 hours each day in exercise?

Five, (2 questions, Question 19 is worth 8 points, Question 20 is worth 10 points, full score 18 points)

19. Cars A and B travel from city Alpha to city Beta at the same time. Car A travels 35 kilometers per hour, and car B travels 40 kilometers per hour. As a result, B arrives at city B half an hour earlier than A. How many kilometers is the distance between cities A and B?
20. There are two charging methods for dial-up access to the network in a certain place, and users can choose one of them: A. Timing system: 3 dollars/hour; B. Monthly system: 50 dollars/month (limited to one personal residential phone to access the network). In addition, each Internet access method has to charge an additional communication fee of 1.2 dollars/hour.
- ( 1 ) If a user spends  $x$  hours online in a certain month, write down the fees that the user should pay under the two charging methods;
- ( 2 ) If a user estimates that the Internet access time is 25 hours a month, which method do you think is more cost-effective?

**Test B (full score 50 points)**

One, fill in the blanks (5 questions, 4 points per question, full score 20 points)

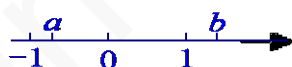
21. If  $a^{m-2}b^{n+7}$  and  $-3a^4b^4$  are like terms, then  $m + n = \underline{\hspace{1cm}}$  °

22. In 2010, a city's junior high school graduation and entrance examinations for each subject and full score are as follows:

If the ratio of the full scores of each subject in the junior high school graduation and entrance examination in a city in 2010 is drawn into a pie chart, the central angle of the sector where the mathematics subject is located is        degrees.

Subject	English	Math	Spanish	Politics	Science	PE
Full score	150	150	150	70	180	50

23. As shown,  $a$  and  $b$  are rational numbers, meaning  $|a| + |b| + |a + b| + |b - a|$  has a result of        °



24. Given that  $2 + \frac{2}{3} = 2^2 \times \frac{2}{3}, 3 + \frac{3}{8} = 3^2 \times \frac{3}{8}, 4 + \frac{4}{15} = 4^2 \times \frac{4}{15} \dots\dots$

$10 + \frac{a}{b} = 10^2 \times \frac{a}{b}$  (  $a, b$  are positive integers ), then  $b - a = \underline{\hspace{1cm}}$  °

25. There are 4 students, and the number of apples they get is exactly one more than the last person, and the product of their apples is 5040, then the sum of the apples they get is       .

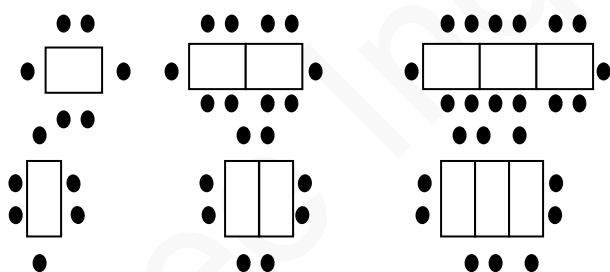
Two, (1 question, full score 8 points)

26. If  $x$  is a variable in the following function  $mx + 2 = 2(m - x)$  and its solution satisfies  $|x - \frac{1}{2}| - 1 = 0$ , then find the value of  $m$ .

Three, (1 question, full score 10 points)

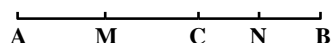
27. In a restaurant, each table seats 6 people. The different ways to arrange the tables are shown as follows. Answer the following questions:

- (1) When there are  $n$  tables, how many people can be seated in two of all the arrangements?
- (2) At noon one day, the restaurant has to receive 98 customers to eat together, but there are only 25 such tables in the restaurant. If you are the manager of this restaurant, which way do you plan to set the table? Why?



Four, (1 question, full score 12 points)

28. As shown, Point  $C$  is on line  $AB$ . Points  $M$  and  $N$  are each the midpoints of  $AC$  and  $BC$ .



- ( 1 ) If  $AC = 9\text{cm}$ ,  $CB = 6\text{ cm}$ , find the length of  $MN$ ;
- ( 2 ) If  $C$  was a random point of  $AB$ , and satisfies  $AC + CB = a\text{ cm}$ , without changing any of the other expectations, can you find the length of  $MN$ ? Add your reasons. Can you use one sentence to describe your conclusion?
- ( 3 ) If  $C$  is an extension of line segment  $AB$  and  $AC - BC = b\text{ cm}$ ,  $M$  and  $N$  are the midpoints of  $AC$  and  $BC$ , respectively, can you guess the length of  $MN$ ? Please draw a sketch, write your conclusion, and explain why.



## Tuqiao School District 2017-2018 Final 7th grade Math Exam

### Answer Key

**One, multiple choice** (10 questions, 3 points per question, full score 30 points)

Prob lem	1	2	3	4	5	6	7	8	9	10
Ans wer	B	A	D	C	D	D	C	C	C	D

**Two, fill in the blanks** (5 questions, 3 points per question, full score 15 points)

11. -3.5 or 0.5 . 12. ③④ . 13. 24/7 . 14. 15<sup>0</sup> . 15. 3n+1 .

**Three, calculation problems** (3 questions, 7 points per question, full score 21 points)

16. ( 1 ) Calculate:  $-2^3 + [18 - (-3) \times 2] \div 4$

S: Original Equation =  $-8 + (18 + 6) \div 4$

$$= -8 + 6$$

$$= -2$$

( 2 ) Simplify and substitute :  $2(3x^2 - 5y) - [-3(x^2 - 3y)]$  , among them  $x = \frac{1}{3}$  ,

$y = -2$

S: Original equation =  $6x^2 - 10y + 3x^2 - 9y$

$$= 9x^2 - 19y$$

When  $x = \frac{1}{3}$  and  $y = -2$ , original equation  $= 1 + 38 = 39$

(3) Solve for  $x$   $\frac{x-6}{4} - x = \frac{x+5}{2}$

S: Removing the denominators,  $2(x-6) - 8x = 4(x+5)$

Removing brackets,  $2x - 12 - 8x = 4x + 20$

Combining like terms,  $-10x = 32$

Turning the coefficient into 1,  $x = -3.2$

Four, short answer questions (2 questions, 8 points, full score 16 points)

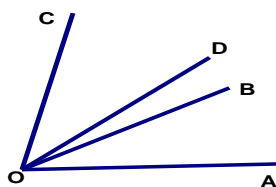
17.

S: Let the measure of  $\angle AOB$  be  $x$  degrees, then  $\angle BOC = 2x$ ,

$$(2x+x)/2 - x = 14$$

Simplified,  $x = 28$

A: The measure of  $\angle AOB$  is 28 degrees



18.  $(1) 60 \div 30\% = 200$  ( people )

( 2 ) B is 100 people

( 3 )  $3000 \times 5\% = 150$  ( people )

Five, (2 questions, Question 19 is worth 8 points, Question 20 is worth 10 points, full score 18 points)

19. S: Let A arrive at Beta after  $x$  hours,

$$35x = 40(x - 0.5)$$

Simplified,  $x = 4$ .

The distance between Alpha and Beta is  $35 \times 4 = 140$  km.

A: The distance between Alpha and Beta is 140 kilometers.

20. S: (1) If using charging method A, the cost would be  $(3 + 1.2)x = 4.2x$  (dollars)

If using charging method B, the cost would be  $(50 + 1.2x)$  dollars

(2) If the total time online was 25 hours,

according to charging method A, that would cost  $4.2 \times 25 = 105$  dollars,

according to charging method B, that would cost  $50 + 1.2 \times 25 = 80$  dollars.

A: Using charging method B would be more cost-efficient.

**Test B (full score 50 points)**

One, fill in the blanks (5 questions, 4 points per question, full score 20 points)

21. 3 ° 22. 72 ° 23. 3b-a ° 24. 89 ° 25. 34 °

Two, (1 question, full score 8 points)

26. S: because  $|x - \frac{1}{2}| - 1 = 0$ , then  $x = -1/2$  or  $3/2$  (2 points)

When  $x = -1/2$ , the original function is  $-1/2m + 2 = 2(m + 1/2)$ , with a solution of  $m = 2/3$  (3 points)

When  $x = 3/2$ , the original function is  $3/2m + 2 = 2(m + 3/2)$ , with a solution of  $m = -2$  (3 points)

Three, (1 question, full score 10 points)

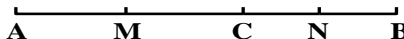
27. S: (1) The number of people that can be seated using the first method:  $4n + 2$

The number of people that can be seated using the second method:  $2n + 4$

(2) Use the first method. The first seating method can seat  $4 \times 25 + 2 = 102 > 98$  people, but

The second seating method can seat  $2 \times 25 + 4 = 54 < 98$  people.

28. S: (1)  $MN = MC + CN = 1/2AC + 1/2BC = 1/2 \times (9 + 6) = 15/2$  or  $7.5$  (cm)



(2)  $MN = 1/2a$  (cm) because  $MN = MC + CN = 1/2AC + 1/2BC = 1/2(AC + BC) = 1/2a$  (cm)

It can be summarized as follows: a point on the line segment divides the line segment into two short line segments, then the distance

between the midpoints of the two short line segments is equal to half of the line segment.

( 3 )  $MN = \frac{1}{2}b(\text{cm})$  because  $MN = MC - CN = \frac{1}{2}AC - \frac{1}{2}BC = \frac{1}{2}(AC - BC) = \frac{1}{2}b(\text{cm})$