Changchun Foreign Language School 2017-2018 Semester 1 Final Exams 7th Grade

Math Exam

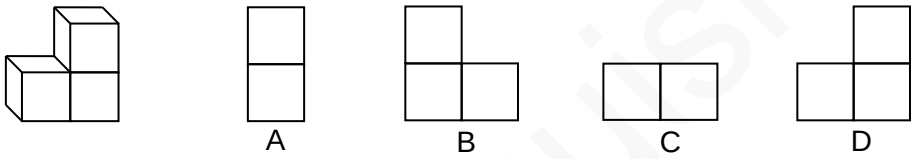
This test consists of three sections, 24 questions, 6 pages. Full score is 20 points. 90-minute test.

One, multiple choice questions (3 points per question, full score 24 points)

1. $|-5|$ = ( )

A · $\frac{1}{5}$ B · 5 C · $-\frac{1}{5}$ D · -5

2. The front view of the figure below is ( )



3. 3500 written in scientific notation is ( )

A · 3.5×10^4 B · 3.5×10^3 C · 35×10^2 D · 0.35×10^4

4. Given that $x=-1$, algebraic expression x^3-x^2+4 equals ( )

A · 2 B · -2 C · 4 D · -4

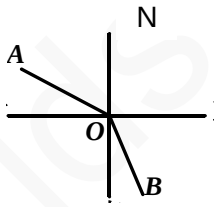
5. If ∠1=25°, then the complementary angle of ∠1 is ( )

A · 55° B · 65° C. 75° D · 155°

6. In the function $3x = 15 - 2x$, x = ( )

A · x=3　　B · x=4　　C · x=5　　D · x=6

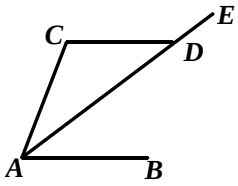
7. As shown, if point A is 60° to the west north of O, point B is 25° east to the north of O, then $\angle AOB$ (Less than a straight angle) equals (　　)



A · 55°　　B · 95°　　C · 125°　　D · 145°

8. As shown, AE bisects $\angle CAB$, $CD \parallel AB$ intersects with AE at D, and $\angle C$ = 120°, then $\angle EAB$ is measured (　　)

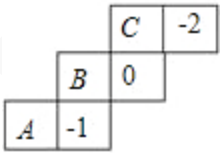
A · 30°　　B · 35°　　C · 40°　　D · 45°



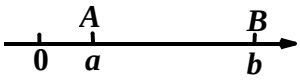
Two, fill in the blanks (3 points per question, full score 18 points)

9. When k = _____, $-3x^2y^{3k}$ and $4x^2y^6$ are like terms.

10. As shown in the figure, there is a cube box that has been laid flat. If you fill in the appropriate numbers into the three squares A、B、C, so that after folding the expanded surface into a cube, and that after folding this net into a cube, the two numbers on the opposite surfaces are opposite numbers. The number filled in B is _____ .

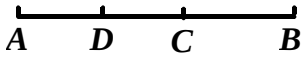


11. It is given that points A and B each represent the numbers a and b on the number line, as shown in the picture. Therefore, the length of AB can be expressed as an algebraic expression: _____.

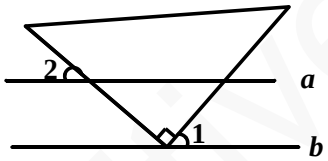


12. In order to help an earthquake-stricken area rebuild their homes, all teachers and students of a class actively donated money, with a total donation of $3150. 5 teachers each donated *a* dollars, then the amount of money donated in all by the students is_____ dollars (express using an algebraic expression containing *a*).

13. As shown, *C* and *D* are two points on *AB*, *D* is the midpoint of *AC*. If *CB* = 3, *DB* = 7, then *AC* =___ .



14. As shown, *a* ∥ *b*, placing the right-angled vertex of the triangular board on line *b*. If ∠1 = 35°, then ∠2 has a measure of _____ degrees.



Three, short answer questions (10 questions, full score 78 points)

15. (8 points) Calculate: (1) $-\frac{5}{3}+\frac{2}{3}$; (2) $2-(-3)$;

(3) $-\frac{3}{2}\times 6$; (4) $-4\div(-2)$.

16. (6 points) Calculate (1) $(-1)^{2016}-2\div\frac{1}{2}\times 3+(-2)^2$; (2) $4(a-b)-(2a-b)$.

17. (6 points) Solve for *x*: (1) $3(x-2)+2(x+1)=1$; (2) $\frac{x}{3}-\frac{x-1}{6}=1$.

18. (7 points) First simplify, and then substitute: $(5a^2+2a+1)-4(3-8a+2a^2)+(3a^2-a)$, $a=\frac{1}{3}$.

19. (7 points) There are 20 baskets of apples, with each basket weighing 25 kilograms on average. The excess or insufficient kilograms are represented by positive and negative numbers, and the data is as follows:

Difference from standard quality (Unit: kilograms)	-3	-2	-1.5	0	1	2.5
Number of baskets	1	4	2	3	2	8

(1) Of the 20 baskets of apples, how many kilograms are the heaviest baskets than the lightest baskets?

(2) Find the total mass of the 20 baskets of apples.

20. (8 points) As shown, points C and D are two points on AB, $AC:CD = 1:3$, point D is the midpoint of CB, $AD = 12$.

(1) Find the length of AC;

(2) Find the length of AB.

21. (8 points) **Discover:** In figure ①, lines AB, BC, AC intersect two by two, with each of the intersecting points A、B、C, point D on AB. $DE \parallel BC$ and intersects with AC at point E. $EF \parallel AB$ intersects with BC at F. If $\angle ABC = 40°$, find $\angle DEF$.

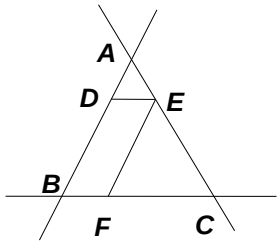


Figure 1

Complete the mathematical process to solving the problem below:

S: $\because DE \parallel BC$,

$\therefore \angle DEF =$ _____ . ( )

$\because EF \parallel AB$,

$\therefore$ _____ $= \angle ABC$. ( )

$\therefore \angle DEF = \angle ABC$. (Conversion of units)

∵∠*ABC*=40° ·

∴∠*DEF*=_____° ·

Apply: According to figure ②, lines *AB*, *BC*, *AC* are pairs of intersecting lines. Their intersecting points are *A*, *B*, *C*, point *D* on the extension of line segment AB. *DE*∥*BC* intersects *AC* at point *E*. *EF*∥*AB* intersects *BC* at point *F*. If ∠*ABC* = 60°, then ∠*DEF* = _____° ·

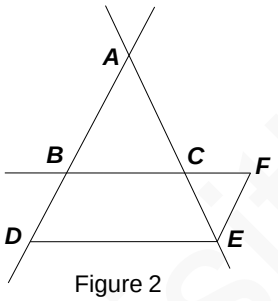
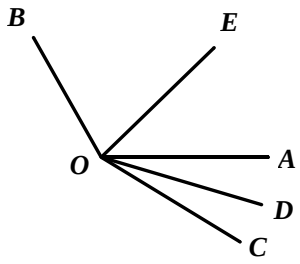


Figure 2

22. (8 points) As shown, *OD* bisects ∠*AOC*. *OE* bisects ∠*BOC*. If ∠*AOB* = 100°, find the measure of ∠*DOE*.



23. (8 points) A certain class is going to buy some table tennis balls and ping pong rackets. Their current situation is as follows: Stores A and B sells0 table tennis balls and ping pong rackets at the same costs. Ping-pong rackets cost 68 dollars each, and each ping-pong ball box costs 12 dollars. After some negotiating, they came up with a deal: Every time Store A sold one racket and one box of ping-pong balls, Store B gets a 10% discount on the list price. This class needs a total of 5 rackets, and *x* boxes of balls. $(x \geq 5)$.

(1) Find the cost (expressed by algebraic expression including x) of stores A and B.

(2) When $x = 40$, which store is more worth it? Explain through your calculation.

24. (12 points) In triangle ABC, AB = 16cm, AC = 12 cm, BC = 20 cm. Point P starts from A and, traveling at a speed of 2 cm/s, goes from $A \rightarrow B \rightarrow C$. Point Q starts from point C and, traveling at 1cm/s goes from $C \rightarrow A \rightarrow B$. If points P and Q start at the same time, in t (seconds) then:

(1) As shown in Figure 1, please an algebraic expression including t to express:

①When Q is on AC, CQ = _____ ; ②When Q is on AB, AQ = _____ ;

③When P is on AB, BP = _____ ; ④When P is on BC, BP = _____ .

(2) As shown in Figure 2, if point P is on AB, and point Q is on CA, when $QA = AP$, find t.

(3) As shown in Figure 3, when P arrives at C, both points P and Q stops moving. When $AQ = BP$, find t.

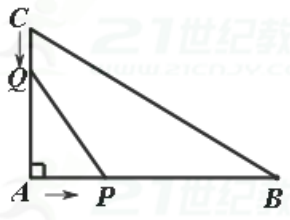


Figure 1

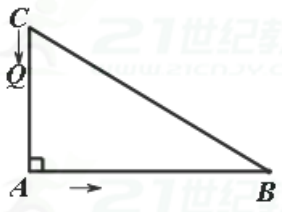


Figure 2

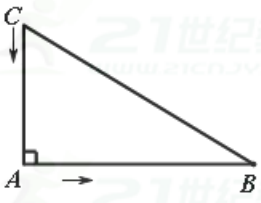


Figure 3

Answer Key

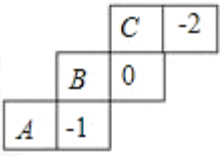
One, multiple choice questions (3 points per question, full score 24 points)

1. B 2.D 3.B 4.A 5.B 6.A 7.D 8.A

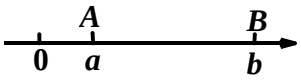
Two, fill in the blanks (3 points per question, full score 18 points)

9. When k = __2____, $-3x^2y^{3k}$ and $4x^2y^6$ are like terms.

10. As shown in the figure, there is a cube box that has been laid flat. If you fill in the appropriate numbers into the three squares A、B、C, so that after folding the expanded surface into a cube, and that after folding this net into a cube, the two numbers on the opposite surfaces are opposite numbers. The number filled in B is ___2_____ .

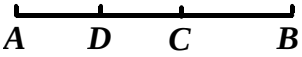


11. It is given that points A and B each represent the numbers a and b on the number line, as shown in the picture. Therefore, the length of AB can be expressed as an algebraic expression: ___b-a___.

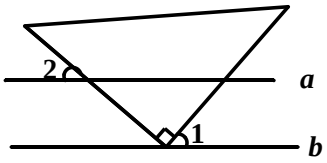


12. In order to help an earthquake-stricken area rebuild their homes, all teachers and students of a class actively donated money, with a total donation of $3150. 5 teachers each donated a dollars, then the amount of money donated in all by the students is_____(3150-5a)_____ dollars (express using an algebraic expression containing a).

13. As shown, C and D are two points on AB, D is the midpoint of AC. If CB = 3, DB = 7, then AC =_8__ .



14. As shown, $a \parallel b$, placing the right-angled vertex of the triangular board on line b. If $\angle 1 = 35°$, then $\angle 2$ has a measure of _____55_____ degrees.



Three, short answer questions (10 questions, full score 78 points)

15. (8 points) Calculate: (1) $-\frac{5}{3}+\frac{2}{3}=-1$; (2) $2-(-3)=5$;

(3) $-\frac{3}{2}\times 6=-9$; (4) $-4\div(-2)=2$.

16. (6 points) Calculate (1) $(-1)^{2016}-2\div\frac{1}{2}\times 3+(-2)^2$; (2) $4(a-b)-(2a-b)$.

17. (6 points) Solve for x: (1) $3(x-2)+2(x+1)=1$; (2) $\frac{x}{3}-\frac{x-1}{6}=1$.

18. (7 points) First simplify, and then substitute: $(5a^2+2a+1)-4(3-8a+2a^2)+(3a^2-a)$, $a=\frac{1}{3}$.

33a-11=0

19. (7 points) There are 20 baskets of apples, with each basket weighing 25 kilograms on average. The excess or insufficient kilograms are represented by positive and negative numbers, and the data is as follows:

Difference from standard quality (Unit: kilograms)	-3	-2	-1.5	0	1	2.5
Number of baskets	1	4	2	3	2	8

(1) Of the 20 baskets of apples, how many kilograms are the heaviest baskets than the lightest baskets?

2.5 - (-3) = 5.5 (kilograms)

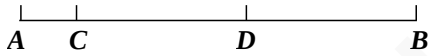
(2) Find the total mass of the 20 baskets of apples.

20*25+（-3）+（-8）+（-3）+0+2+20=508（kilograms）

20. (8 points) As shown, points *C* and *D* are two points on *AB*, *AC*: *CD* = 1: 3, point *D* is the midpoint of *CB*, *AD* = 12.

(1) Find the length of *AC*. 3

(2) Find the length of *AB*. 21



21. (8 points) **Discover:** In figure ①, lines *AB*, *BC*, *AC* intersect two by two, with each of the intersecting points *A*、*B*、*C*, point *D* on *AB*. *DE*∥*BC* and intersects with *AC* at point *E*. *EF*∥*AB* intersects with *BC* at *F*. If ∠*ABC*=40°，find ∠*DEF*.

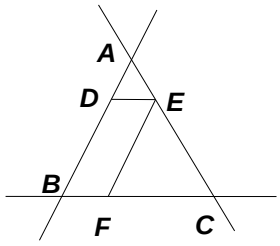


Figure 1

Complete the mathematical process to solving the problem below:

S: ∵*DE*∥*BC*，

∴∠*DEF*= ∠EFC .

∵*EF*∥*AB*，

∴ ∠EFC =∠*ABC*.

∴∠*DEF*=∠*ABC*.

∵∠*ABC*=40°，

∴∠*DEF*= 40 °.

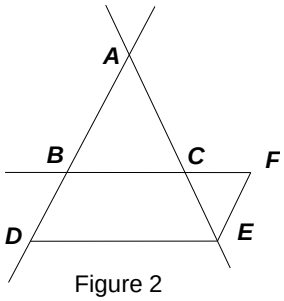
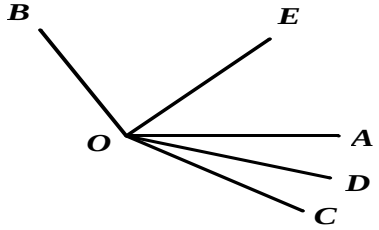


Figure 2

Apply: In Figure ②, lines *AB*、*BC*、*AC* intersect at the points *A*、*B*、*C*. Point *D* is on *AB*. *DE*∥*BC* intersects with *AC* at point *E*, *EF*∥*AB*. If ∠*ABC* = 60°, then ∠*DEF* = 120 °.

22. (8 points) As shown, *OD* bisects ∠*AOC*. *OE* bisects ∠*BOC*. If ∠*AOB* = 100°, find the measure of ∠*DOE*.

∠DOE=50°



23. (8 points) A certain class is going to buy some table tennis balls and ping pong rackets. Their current situation is as follows: Stores A and B sells0 table tennis balls and ping pong rackets at the same costs. Ping-pong rackets cost 68 dollars each, and each ping-pong ball box costs 12 dollars. After some negotiating, they came up with a deal: Every time Store A sold one racket and one box of ping-pong balls, Store B gets a 10% discount on the list price. This class needs a total of 5 rackets, and *x* boxes of balls. ($x \geq 5$).

(1) Find the cost (expressed by algebraic expression including *x*) of stores A and B.

(2) When $x = 40$, which store is more worth it? Explain through your calculation.

(1) A: 68 * 5 + 12 (x-5) = 12x + 280

B: 68 * 5 * 0.9 + 0.9 * 12x = 306 + 10.8x

(2) When x=40, 12*40+280=760 (dollars）

When x = 40, 306 + 10.8 * 40 = 738 (dollars)

24. (12 points) In triangle *ABC*, *AB* = 16cm, *AC* = 12 cm, *BC* = 20 cm. Point *P* starts from *A* and, traveling at a speed of 2 cm/s, goes from *A*→*B*→*C*. Point *Q* starts from point *C* and, traveling at 1cm/s goes from *C*→*A*→*B*. If points *P* and *Q* start at the same time, in *t* (seconds) then:

(1) As shown in Figure 1, please an algebraic expression including *t* to express:

①When *Q* is on *AC*, *CQ* = __t__ ; ②When *Q* is on *AB*, *AQ* = __12-t__ ;

③When P is on AB, BP = 16-2t ; ④When P is on BC, BP = 2t-16 .

(2) As shown in Figure 2, if point P is on AB, and point Q is on CA, when $QA = AP$, find t. t = 4

(3) As shown in Figure 3, when P arrives at C, both points P and Q stops moving. When $AQ = BP$, find t.

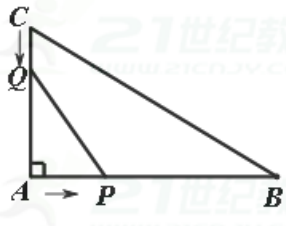


Figure 1

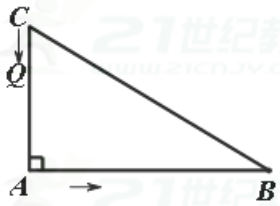


Figure 2

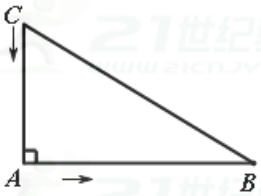


Figure 3

t= 4, 28/3