Nong'an County, Changchun City, Jilin Province 2017-2018 7th Grade First Term Mathematics Exam

One, multiple choice (**10** questions; full score **30** points)

1. If rational numbers m and n satisfy $mn > 0$, and $m + n < 0$, which one of the following statements are correct? ( )

A. m · n could be one positive, one negative B. m · n are both positive

C. m · n are both negative D. Either m or n is a 0

2. Among the four numbers -2, 0, 1, 3, which one is negative? ( )

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

3. A watch is pointing towards 3 o' clock. The angle between its minute and hour finger (less than 180°) is ( )

A. 30° B. 60° C. 75° D. 90°

4. As shown, ∠BAC = 90°, AD⊥BC, intersecting at D. Which one of the following statements are true? ( )

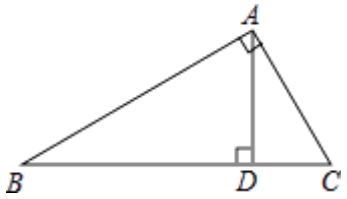
①AB and AC are parallel;

②AD and AC are perpendicular;

③ A perpendicular lien from point C to AB is AB;

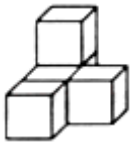
④ Line AB to point B has a distance equivalent to AC;

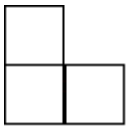
⑤ Line AC is the distance from point B to AB.

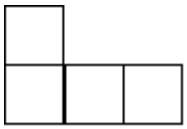


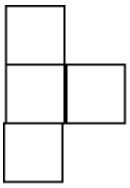
A. 2 B. 3 C. 4 D. 5

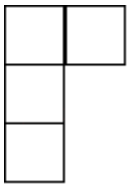
5. The view from the front of the figure would be ( )



A. 

B. 

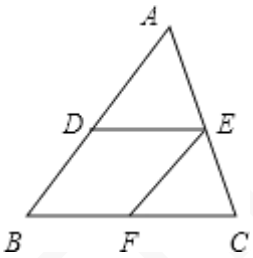
C. 

D. 

6. One person every day consumes 0.32L of water, then if 1 million people use water every day, you write it in scientific notation as ( )

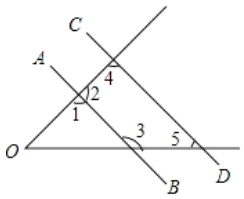
A. 3.2×10^{7}L B. 3.2×10^{6}L C. 3.2×10^{5}L D. 3.2×10^{4}L

7. As shown, DE ∥ BC, EF ∥ AB. How many angles are supplementary to ∠BFE? ( )



A. 2 B. 3 C. 4 D. 5

8. As shown, given that AB ∥ CD, which of the following relationships are true? ( )



A. ∠1=∠3 B. ∠2=∠4 C. ∠1 > ∠4 D. ∠3+∠5=180°

9. If traveling east 2km is recorded as -2km, then + 3km represents ( )

A. Traveling east 3km B. Traveling south 3km

C. Traveling west 3km D. Traveling north 3km

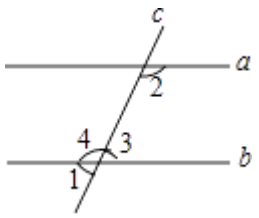
10. Which one of the following pairs are like terms? ( )

A. 4 and 4x B. $3x^2y^3$ and $-y^2x^3$ C. $2ab^2$ and $100ab^2c$ D. m and $\frac{m}{2}$

Two, fill in the blanks (8 questions; full score 24 points)

11. If a and b are each reciprocal, and c、d are opposite numbers, with m being the largest negative number, then $(ab)^5 - 3(c+d-m)^2$=_____.

12. As shown, fill in the blanks.



Given that: ∠1 + ∠2 = 180°, prove that a ∥ b.

Proof: ∵∠1 = ∠3_____.

∠1 + ∠2 = 180°_____

∴∠3 + ∠2 = 180_____

∴a ∥ b_____

Write down another way to prove this.

13. $\sqrt{7}-3$ has an absolute value of _____ .

14. $-\frac{3}{2}$ has an opposite number of _____, $-\left(-\frac{1}{2}\right)$ has a reciprocal of _____, + (- 5) has an absolute value of _____ .

15. Simplify: - a - a=_____ .

16. 166900 written in scientific notation is _____ .

17. A polynomial added with x^2 - 2x+1 has a sum of 2x - 3. This polynomial is_____ .

18. 0.002048 rounds to two significant digits to _____, which is an approximation to the _____ place.

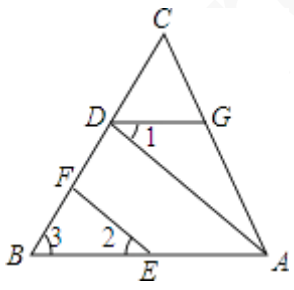
Three, short answer problems (6 questions, full score 36 points)

19. When simplifying ($2x^3$ - $3x^2y$ - $2xy^2$) - (x^3 - $2xy^2$+y^3) + (- x^3+$3x^2y$ - y^3) , x = 0.5, y = - 1. A student accidentally confused x = 0.5 with x = - 0.5, but still managed to get the correct answer. How? What is the final answer?

20. If |a| = 6, |b| = 5, and a < b, find the value of a + b.

21. Plot the numbers - 2.5 , - 4 , $\frac{1}{2}$, 3 , 5 on a number line, then list them using the " < " sign.

22. As shown, EF ∥ AD, ∠1 = ∠2, ∠BAC = 70°. Find the measure ∠CGD.



23. IF |3a - 1| + |b - 2| = 0, find the value of a + b.

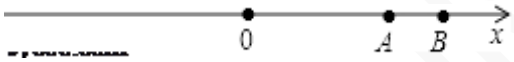
24. As shown, battleship A is east of battleship B. They then both spot an enemy ship. Battleship A spotted it 15 degrees east of north, and battleship B found it exactly northeast.

(1) Sketch the position of the enemy ship (name it battleship C).

(2) Find the degree of ∠BCA= ?

Four, comprehensive questions (full score 10 points)

25. As shown, the two points A and B on the number line each represent 20 and 30. P and Q each start from points A and O, at speeds of 2 units and 4 units per second towards the positive direction. They travel for t seconds.



(1) When t = 2, P and Q are each at _____ ; PQ = _____ ;

(2) Point C is a point on the number line left of point B. Another number with the same distance to B is x, and CB = 2CA. Find the value of x;

(3) While starting from point P and point Q, R starts from point B at a speed of 8 units per second, starts to move to the left, and immediately returns to the right after encountering point Q, and immediately returns to the direction when encountering point P. Move to the left, return immediately after meeting point Q, going back and forth in this way until the two points P and Q meet. Then, R stops moving. How many unit lengths was the total distance of R's movement? What is the number corresponding to where point R stops?

Answer Key

One, multiple choice

1.【Answer】C

【Lesson Key Point】The multiplication of rational numbers

【Solution】If rational numbers m and n satisfy $mn > 0$, options A and D are eliminated;

Furthermore, if $m + n < 0$, option B is eliminated;

m and n are both negative, so option C is correct.

2.【Answer】A

【Lesson Key Point】Positive and negative numbers

【Solution】Among the four numbers $-2 \cdot 0 \cdot 1 \cdot 3$, the negative number is -2.

3.【Answer】D

【Lesson Key Point】Clock angles

At 3 o clock, the minute and hour hand are 3 large marks away from each other.

∵ There are 12 numbers on a clock, so the distance between every two numbers is 30°.

∴At 3 o clock, the angle between the hour and minute hand is $3 \times 30° = 90°$.

4.【Answer】A

【Lesson Key Point】The distance from a point to line

【Solution】①AB and AC are perpendicular lines, correct;

②AD and AC are perpendicular lines, incorrect;

③ The perpendicular line from point C to AB is AB, incorrect, it should be AC;

④ The length of AB is the distance between B and AC, correct;

⑤ The length of AB is the distance between B and AC, incorrect, it should be that the length of AB is the distance between B and AC;

There are two statements that are true.

5.【Answer】A

【Lesson Key Point】Three Views of a 3D Figure

【Solution】From the front, there are two small squares on the first layer and a small square on the left of the second layer, so choose: A.

6.【Answer】C

【Lesson Key Point】Scientific notation

【Solution】1M × 0.32 = 320000, written in scientific notation would be 3.2×10^5 .

7.【Answer】C

【Lesson Key Point】The property of opposite angles, supplementary angels, and parallel lines

【Solution】∵DE ∥ BC, ∴∠BFE + ∠DEF = 180°

①∠BFE + ∠EFC = 180°

② 又 ∵ EF ∥ AB,

∴∠BFE + ∠B = 180°

③ ∠B = ∠ADE，

∴∠BFE + ∠ADE = 180°

④ There is a total of 4, so select C.

8.【Answer】D

【Lesson Key Point】The property of parallel lines

【Solution】∵AB ∥ CD, ∴∠1 = ∠4, ∠2 + ∠4 = 180°, ∠3 + ∠5 = 180°,

Select D.

9.【Answer】C

【Lesson Key Point】Positive and negative numbers

【Solution】

∵ Traveling east 2km is recorded as -2km,

∴ So traveling +3km would represent traveling east 3km.

10.【Answer】D

【Lesson Key Point】Like terms and combining like terms

【Solution】A、The variables contained in the two are different, so this option is wrong;

B、The exponents of the same variables contained in the two are different, so this option is wrong;

C、The variables contained in the two are different, so this option is wrong;

D、Both are in line with the definition of similar items, so this option is correct;

Two, fill in the blanks

11.【Answer】-2

【Lesson Key Point】Solving algebraic expressions

【Solution】Given in the problem: ab = 1, c + d = 0, m= - 1 ·

so the expression would be substituted, =1 - 3× (0 - 1) ^{2}=1 - 3= - 2 ·

Final answer: - 2 ·

12.【Answer】Opposite angles are equivalent; Substitution of values; Same-side interior angles are complementary if lines are parallel

【Lesson Key Point】Determining parallel lines

【Solution】Proof: ∵∠1 = ∠3 are equal as opposite angles, ∠1 + ∠2 = 180° is given,

∴∠3 + ∠2 = 180° can be substituted,

∴a ∥ b are parallel because of same-side interior angles complement.

Another solution:

∵∠1 + ∠2 = 180°, ∠1 + ∠4 = 180°,

∴∠2 = ∠4,

∴a ∥ b.

13.【Answer】3 - $\sqrt{7}$

【Lesson Key Point】Absolute value

【Solution】$\sqrt{7}-3$ has an absolute value of $3-\sqrt{7}$.

Correct answer: $3-\sqrt{7}$.

14.【Answer】$\frac{3}{2}$; 2; 5

【Lesson Key Point】Opposite numbers, absolute value, reciprocals

【Solution】$-\frac{3}{2}$ has an opposite number of $\frac{3}{2}$, $-\left(-\frac{1}{2}\right)=\frac{1}{2}$. $\frac{1}{2}$ has a reciprocal of 2, $+(-5)=-5$. -5 has an absolute value of 5.

Final answer: $\frac{3}{2}$, 2, 5.

15.【Answer】-2a

【Lesson Key Point】Like terms, combining like terms

【Solution】$-a-a=-2a$.

Final answer: $-2a$.

16.【Answer】1.67×10^5

【Lesson Key Point】Approximate numbers

【Solution】Express the approximate number 166900 in scientific notation with three significant digits as:1.67×10^5.

Final answer: 1.67×10^5

17.【Answer】$-x^2+4x-4$

【Lesson Key Point】The addition and subtraction of whole expressions

【Solution】$(2x-3)-(x^2-2x+1)$

$=2x-3-x^2+2x-1$

$=-x^2+4x-4$.

Final answer: $-x^2+4x-4$.

18.【Answer】0.0020；ten thousandth

【Lesson Key Point】Approximate numbers

【Solution】Given from the problem: 0.002048 ≈ 0.0020, approximate 0.0020 to the ten thousandths place

Three, short answer questions

19.【Answer】S: Original Equation $=2x^3-3x^2y-2xy^2-x^3+2xy^2-y^3-x^3+3x^2y-y^3=-2y^3$.

x doesn't affect the final answer,

so if the student misunderstood $x=0.5$ for $x=-0.5$, he would still be correct.

【Lesson Key Point】Combining like terms and removing brackets

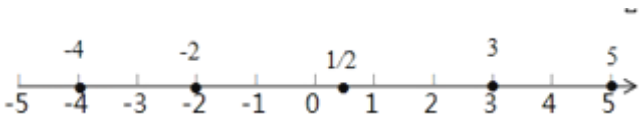
20.【Answer】S: ∵$|a|=6$, $|b|=5$, and $a<b$,

∴$a=-6$, $b=5$; $a=-6$, $b=-5$,

so $a+b=-1$ or -11.

【Lesson Key Point】Absolute value and addition of rational numbers

21.【Answer】S: -2.5, -4, $\frac{1}{2}$, 3, 5 plotted on the number line is as shown:



∴ Ordered from least to greatest, it's:

$-4 < -2 < \frac{1}{2} < 3 < 5$.

【Lesson Key Point】Number lines and comparing rational numbers

22.【Answer】S: ∵EF∥AD, ∴∠2=∠DAE,

∵∠1=∠2,

∴∠1=∠DAE,

∴DG∥AB,

∴∠CGD=∠BAC=70°

【Lesson Key Point】Properties and determining of parallel lines

23.【Answer】S∵|3a—1|+|b—2|=0,

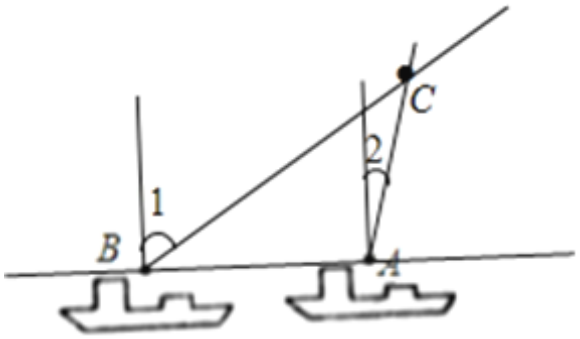
又∵3a-1≥0 ,b-2≥0;

∴3a-1=0,b-2=0,

Solution: a= $\frac{1}{3}$,b=2,

∴a+b= $\frac{1}{3}$ +2= $\frac{7}{3}$

【Lesson Key Point】Addition of rational numbers

24.【Answer】S: (1) As shown 

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(2) From the sum and differences in the interior angles,

∠CBA=90° - ∠1=45° ∴∠BAC=90°+15°=105° ∴

∠BCA=180° - ∠CBA - ∠CAB=180° - 45° - 105°=30° ∴

【Lesson Key Point】Clocks, azimuth angles, and angles within a triangle

Four, comprehensive questions

25.【Answer】(1) 24 and 8; 16

(2) S: ∵CB = 2CA, ∴30 - x = 2 (x - 20) or 30 - x = 2 (20 - x) ∴

∴x= $\frac{70}{3}$ or 10

(3) S: After t seconds, P and Q meet. 4t - 2t=20 ∴ ∴t=10 ∴

∴The distance R travels in all is 8×10=80. At this time, P, Q, and R are at the same point, so the number corresponding to the position of point R is 40

【Lesson Key Point】Number lines, finding algebraic expressions, linear equations