2017-2018 Hefei City, Anhui Province, Grade 7 (Part 1) Third Monthly Mathematics

One, multiple choice questions: (10 questions, 4 points per question, full score 40 points)

1. (4 points) $-\frac{1}{3}$ has an absolute value of ( )

A · 3 B · -3 C · $\frac{1}{3}$ D · $-\frac{1}{3}$

2. (4 points) Out of the following, ① -(-2); ② -|-2|; ③ -2^2; ④ $-(-2)^2$, how many of the results are negative? ( )

A · 4 B · 3 C · 2 D · 1

3. (4 points) Out of the following pairs, which ones are NOT like terms? ( )

A · $12x^2y$ and $13x^2y$ B · -ab and 3ba C · -3 and 7D · $25x^2y$ and $52xy^3$

4. (4 points) Out of the following: a^2 - 1 · $\frac{1}{a}$ · $\frac{2}{3}ab^2$ · 0 · -5x, how many of them are monomials? ( )

A · 1 B · 2 C · 3 D · 4

5. (4 points) Which one is a linear equation? ( )

A · -3x-y=0 B · x=0 C · $2+\frac{1}{x}=3$ D · $3x^2+x=8$

6. (4 points) Given that the numbers a and b are plotted as shown on the number line, which of the following conclusions are incorrect? (　　)

A · a+b＜0　B · a - b＞0　C · ab＜0　　D · $\frac{b}{a}$＞0

7. (4 points) Given that the value of algebraic expression x+2y is 3, than the value of algebraic expression 3x+6y+1 is (　　)

A · 7　B · 4　C · 10 D · 9

8. (4 points) Rounding 6.965 to the nearest approximation, which of the following statements is correct (　　)

A · 6.96 (accurate to 0.01)　　B · 6.9 (accurate to 0.1)

C · 7.0 (accurate to 0.1)　D · 7 (accurate to 0.1)

9. (4 points) 41 people are part of a project that requires removing earth from one area of land, and there are 30 poles to fit into each hole. How many people should be arranged to carry the soil and how many people to pick the soil so that the poles can be matched with the number of people? If there are x people picking soil, the equation listed is (　　)

A · 2x - (30 - x) =41　　B · $\frac{x}{2}$+ (41 - x) =30　　C · x+$\frac{41-x}{2}$=30　　D · 30 - x=41 - x

10. (4 points) Participating in medical insurance, hospitalized patients enjoy segmented reimbursement. The reimbursement rules formulated by the insurance company are as follows. If a person is hospitalized and the insurance company reimburses the amount of 1,100 dollars, then the medical expenses of the person in hospital are ( )

Inpatient medical expenses ($)	Reimbursement rate (%)
Part not exceeding 500 dollars	0
The part exceeding 500-1000 dollars	60
The part exceeding 1000-3000 dollars	80
…	

A · 1000 dollars B · 1250 dollars C · 1500 dollars D · 2000 dollars

Two, fill in the blanks: (4 points per blank, full score 40 points)

11. (4 points) 26400000000 written in scientific notation is _____ ·

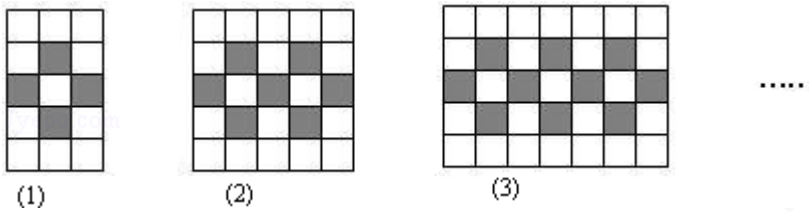
12. (8 points) $-\frac{2\pi x^3y^2}{3}$ has a coefficient of_____, and a degree of_____ ·

13. (4 points) Given that $(a-2)x^{|a|-1}+4=0$ is a linear equation about x, then a=_____ ·

14. (4 points) If $3x^{m+5}y^3$ and x^2y^{n+1} are like terms, then $(m+n)^{2017}+mn$=_____ ·

15. (4 points) There is a math practice paper with only 25 multiple-choice questions. If you get one right, you will get 4 points, and if you get one wrong, you will deduct 1 point. A student has completed all the exercises and got a total of 70 points. He answered _____ questions correctly.

16. (4 points) Use black and white square tiles of the same specification to lay the floor as shown in the figure, then _____ black tiles are required in the 2017th figure.



17. (4 points) A store increases the price of a certain microwave oven by 40%, and then sells it at a 20% discount. As a result, each microwave oven earns 180 dollars more than the original price. The original price of this microwave oven is _____ dollars.

18. (4 points) Points A and B are 108 kilometers from each other. Person 1 and 2 each starts from points A and B starts from the same time towards each other, with person 1 traveling at 14 kilometers per hour and person 2 traveling 22 kilometers per hour. After_____ hours would they be 36 kilometers apart.

19. (4 points) In order to save water, a city stipulates that the monthly water consumption of each household does not exceed 20 cubic meters, and the fee is 2 dollars per cubic meter; if it exceeds 20 cubic meters, the excess part is charged at 4 dollars per cubic meter. Now a resident

pays a total of 72 dollars in water charges in December, then the resident actually used _____ cubic meters of water in December.

Three, short answer questions: (70 points total)

20. (12 points) (1) Calculate: $-3^2+|2-5|\div\frac{3}{2}+(-2)^3\times(-1)^{2015}$

(2) Solve for x: $\frac{0.1x-0.2}{0.02}-\frac{x+1}{0.5}=3$.

21. (10 points) First simplify, than substitute: $2xy-\frac{1}{2}(4xy-8x^2y^2)+2(3xy-5x^2y^2)$, among them $x=\frac{1}{3}$, $y=-3$.

22. (10 points) When using aluminum sheets to make canned beverage bottles, each aluminum sheet can make 16 bottle bodies or 43 bottle bottoms. One bottle body is equipped with two bottle bottoms. If there are 150 aluminum sheets, how many sheets are used to make bottle bodies and how many bottom sheets can be used to make a complete set of beverage bottles?

23. (10 points) In the spring outing of teachers and students of a school group, if each car takes 45 people, then there are 20 people left without seats; if each car takes 55 people, then there will be 30 empty seats. How many cars are there? How many students are there?

24. (14 points) An iron ore terminal records the incoming iron ore as positive and the outgoing iron ore as negative. The records of a certain day are as follows: (unit: t)

0+100 · - 80 · +300 · +160 · - 200 · - 180 · +80 · - 160 ·

（1）Did iron ore inventories increase or decrease that day? How many tons were added or subtracted?

（2）The wharf transports iron ore with a large truck with a load capacity of 20t. The freight is 100 dollars each time. How much is the total freight cost on this day?

25. (14 points) A speedboat travels downstream from Pier A to Pier B, while a cruise ship sails downstream from Pier B. It is known that the two piers A and B are 140 kilometers apart, the average speed of the speedboat in still water is 67 kilometers per hour, the average speed of the cruise ship in still water is 27 kilometers per hour, and the current speed is 3 kilometers per hour.

（1）Calculate the distance in kilometers between the two ships when they first set off and sailed for 30 minutes.

（2）If the speedboat returns immediately after arriving at Pier B, how long does it take for the two boats to become exactly 100 kilometers apart?

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Answers and solutions

One, multiple choice questions: (10 questions, 4 points per question, full score 40 points)

1. (4 points) $-\frac{1}{3}$ has an absolute value of ( )

A · 3 B · -3 C · $\frac{1}{3}$ D · $-\frac{1}{3}$

【Analyze】Remove the sign in front of the numerical part of an expression in order to obtain your absolute value.

【Solution】S: $|-\frac{1}{3}|=\frac{1}{3}$ ·

Therefore, the absolute value of $-\frac{1}{3}$ is $\frac{1}{3}$.

Correct answer: C

2. (4 points) Out of the following, ① $-(-2)$; ② $-|-2|$; ③ -2^2 ; ④ $-(-2)^2$ · how many of the results are negative? ( )

A · 4 B · 3 C · 2 D · 1

【Analyze】First simplify each expression and then determine according to the definition of negative numbers.

【Solution】S: ① $-(-2)=2$ ·

② $-|-2|=-2$ ·

③ $-2^2=-4$ ·

④ $-(-2)^2=-4$ ·

There is a total of three negative numbers.

Correct answer: B

3. (4 points) Out of the following pairs, which ones are NOT like terms? ( )

A · $12x^2y$ and $13x^2y$ B · $-ab$ and $3ba$ C · -3 and 7D · $25x^2y$ and $52xy^3$

【Analyze】Like terms contain the same variables, and the each of the same variables have the same exponents.

【Solution】S: A、$12x^2y$ and $13x^2y$ are like terms;

B、$-ab$ and $3ba$ are like terms;

C、-3 and 7 are like terms;

D、$25x^2y$ and $52xy^3$ do not have the same variable parts, so they are unlike terms;

Correct answer: D

4. (4 points) Out of the following: a^2，1，$\frac{1}{a}$，$\frac{2}{3}ab^2$，0，－5x, how many of them are monomials?

（　　）

A．1　B．2　C．3　D．4

【Analyze】Directly use the definition of the monomial to analyze the answer.

【Solution】S: Out of a^2，1，$\frac{1}{a}$，$\frac{2}{3}ab^2$，0，－5x，there is a total of 3 that are monomials: $\frac{2}{3}ab^2$，0，－5x

Correct answer: C

5. (4 points) Which one is a linear equation?（　　）

A．－3x－y=0　　B．x=0　　C．$2+\frac{1}{x}=3$　D．$3x^2+x=8$

【Analyze】Determine using the definition of a linear equation.

【Solution】S: A、－3x－y=0 is a binary linear equation, so this option is incorrect;

B、x=0 is a linear equation, so this option is correct;

C、$2+\frac{1}{x}=3$ is not a whole equation, so this option is incorrect;

D、$3x^2+x=8$ is a quadratic equation, so this option is incorrect;

Correct answer: B

6. (4 points) Given that the numbers a and b are plotted as shown on the number line, which of the following conclusions are incorrect? ( )

A．$a+b<0$　B．$a-b>0$　C．$ab<0$　　D．$\frac{b}{a}>0$

【Analyze】It can be seen from the figure that $a>0$, $b<0$, and $|a|<|b|$, therefore you can determine according to the rules of addition, subtraction, multiplication and division of rational numbers.

【Solution】S: Form the number line we know that $a>0$，$b<0$，and $|a|<|b|$，

Then $a+b<0$，$a-b>0$，$ab<0$，$\frac{b}{a}<0$，

The only one out of the options that is incorrect is D.

Correct answer: D

7. (4 points) Given that the value of algebraic expression x+2y is 3, than the value of algebraic expression 3x+6y+1 is (　　)

A · 7　B · 4　C · 10 D · 9

【Analyze】Solve by substituting the expression x+2y into more complicated ones.

【Solution】S: ∵x+2y=3 ·

∴3x+6y+1=3 (x+2y) +1=3×3+1=10 ·

Correct answer: C

8. (4 points) Rounding 6.965 to the nearest approximation, which of the following statements is correct (　　)

A · 6.96 (accurate to 0.01)　　B · 6.9 (accurate to 0.1)

C · 7.0 (accurate to 0.1)　D · 7 (accurate to 0.1)

【Analyze】Use the accuracy of approximate numbers to determine each option.

【Solution】S: 6.965≈6.97 (accurate to 0.01) ; 6.965≈7.0 (accurate to 0.1) ·

Correct answer: C

9. (4 points) 41 people are part of a project that requires removing earth from one area of land, and there are 30 poles to fit into each hole. How many people should be arranged to carry the soil and how many people to pick the soil so that the poles can be matched with the number of people? If there are x people picking soil, the equation listed is ( )

A．2x﹣（30﹣x）=41　　B．$\frac{x}{2}$+（41﹣x）=30　　C．$x+\frac{41-x}{2}=30$　　D．30﹣x=41﹣x

【Analyze】Let there be x people removing earth, and（41﹣x） people be carrying the soil, and then use relationships given in the problem to create an equation.

【Solution】S: If x people are removing earth and（41﹣x） people are carrying the soil,

Therefore the equation that can be written is $x+\frac{41-x}{2}=30$．

Correct answer: C

10. (4 points) Participating in medical insurance, hospitalized patients enjoy segmented reimbursement. The reimbursement rules formulated by the insurance company are as follows. If a person is hospitalized and the insurance company reimburses the amount of 1,100 dollars, then the medical expenses of the person in hospital are ( )

Inpatient medical expenses ($)	Reimbursement rate (%)
Part not exceeding 500 dollars	0

The part exceeding 500-1000 dollars	60
The part exceeding 1000-3000 dollars	80
…	

A · 1000 dollars B · 1250 dollars C · 1500 dollars D · 2000 dollars

【Solution】S: Assuming that the inpatient medical fee is x dollars, the meaning of the question is:

500×60%+80% (x - 1000) =1100 ·

Solution: x=2000 ·

Answer: The hospital charges are 2000 dollars.

Correct answer: D

Two, fill in the blanks: (4 points per blank, full score 40 points)

11. (4 points) 26400000000 written in scientific notation is 2.64×10^{10} ·

【Solution】S: Representing 26400000000 in scientific notation would be s 2.64×10^{10},

Correct answer: 2.64×10^{10} ·

12. (8 points) $-\frac{2\pi x^3y^2}{3}$ has a coefficient of $-\frac{2\pi}{3}$, and a degree of 5 .

【Solution】S: $-\frac{2\pi x^3y^2}{3}$ has a coefficient of $-\frac{2\pi}{3}$ and a degree of 5.

Correct answer: $-\frac{2\pi}{3}$, 5

13. (4 points) Given that $(a-2)x^{|a|-1}+4=0$ is a linear equation about x, then a= 2 .

【Analyze】An equation containing only one variable, with its index as 1 is called a linear equation. Its standard form is ax+b=0 (a, b are constants and $a\neq 0$).

【Solution】S: From the problem, we know: $\begin{cases} a-2\neq 0 \\ |a|-1=1 \end{cases}$.

Solution: a= - 2,

Correct answer: - 2

14. (4 points) If $3x^{m+5}y^3$ and x^2y^{n+1} are like terms, then $(m+n)^{2017}+mn=$ -7 .

【Analyze】List the equations about m and n according to the index of the same variable, find the values of m and n, and then substitute them into the calculation.

【Solution】S: $3x^{m+5}y^3$ and x^2y^{n+1} like terms.

∴m+5=2，n+1=3，

∴m=﹣3，n=2，

∴m+n=﹣1，

∴（m+n）^{2017}+mn=﹣1+（﹣3）×2=﹣7，

Correct answer: ﹣7

15. (4 points) There is a math practice paper with only 25 multiple-choice questions. If you get one right, you will get 4 points, and if you get one wrong, you will deduct 1 point. A student has completed all the exercises and got a total of 70 points. He answered ____19___ questions correctly.

【Analyze】Assuming that the number of correct questions for a student is x, then the number of wrong questions is (25﹣x), and his score should be 4x﹣(25﹣x)×1, according to which the equation can be listed.

【Solution】S: The number of correct questions for a student is x, then the number of incorrect questions he gets is (25-x) questions, depending on the meaning of the question.

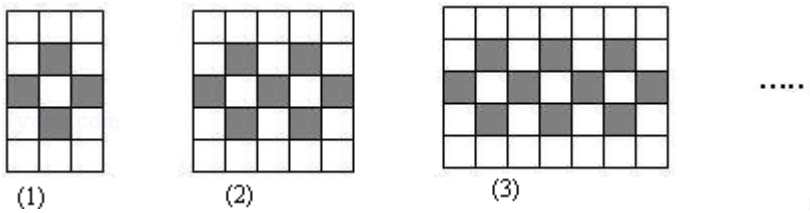
4x﹣（25﹣x）×1=70，

Solution x=19.

A: The number of questions he got correct was 19 questions.

Correct answer: 19

16. (4 points) Use black and white square tiles of the same specification to lay the floor as shown in the figure, then ____6052___ black tiles are required in the 2017th figure.



【Analyze】According to the number of black tiles in each subsequent figure is 3 more than the previous figure, the solution can be obtained accordingly.

【Solution】S: The first figure has 3+1=4 black tiles.

The second figure has 3×2+1=7 black tiles.

The third figure has 3×3+1=10 black tiles.

...

The nth figure has 3n+1 black tiles.

When n=2017, 3n+1=6052,

Correct answer: 6052

17. (4 points) A store increases the price of a certain microwave oven by 40%, and then sells it at a 20% discount. As a result, each microwave oven earns 180 dollars more than the original price. The original price of this microwave oven is ___1500____ dollars.

【Analyze】Suppose the original price of this microwave oven is x dollars, according to the cost price × (1+40%) × 0.8 - cost price = profit, formulate the equation, and the original price can be obtained by solving the equation.

【Solution】S: Let the original price of this microwave oven be x dollars:

（1+40%）x•80%﹣x=180，

Solution: x=1500.

Correct answer: 1500

18. (4 points) Points A and B are 108 kilometers from each other. Person 1 and 2 each starts from points A and B starts from the same time towards each other, with person 1 traveling at 14 kilometers per hour and person 2 traveling 22 kilometers per hour. After___2 or 4___ hours would they be 36 kilometers apart.

【Analyze】Assuming that the distance between the two people is 36 kilometers after x hours, according to the distance = speed × time, the linear equation in one variable about x can be obtained, and the conclusion can be drawn by solving it.

【Solution】S: Suppose the two people are 36 kilometers apart after x hours,

From the problem, we know: （14+22）x=108﹣36 or （14+22）x=108+36，

Solution: x=2 or x=4.

Answer: After 2 or 4 hours would the two people be 36 kilometers apart.

Correct answer: 2 or 4.

19. (4 points) In order to save water, a city stipulates that the monthly water consumption of each household does not exceed 20 cubic meters, and the fee is 2 dollars per cubic meter; if it exceeds 20 cubic meters, the excess part is charged at 4 dollars per cubic meter. Now a resident pays a total of 72 dollars in water charges in December, then the resident actually used ___28____ cubic meters of water in December.

【Analyze】First, it can be judged that the actual water consumption of the villagers in this household exceeds 20 cubic meters, and the actual water consumption is set as x cubic meters. According to the total water fee of 72 dollars, the equation can be obtained and solved.

【Solution】S: Let the actual water use be x cubic meters,

From the problem, we know that the actual water consumption exceeds 20 cubic meters,

Therefore $20\times2+(x-20)\times4=72$,

Solution: x=28.

That is, the household's actual water consumption in December is 28 cubic meters.

Correct answer: 28

Three, short answer questions: (70 points total)

20. (12 points) (1) Calculate: $-3^2+|2-5|\div\frac{3}{2}+(-2)^3\times(-1)^{2015}$

(2) Solve for x: $\frac{0.1x-0.2}{0.02}-\frac{x+1}{0.5}=3$.

【Analyze】(1) Calculated according to the mixed operations of rational numbers;

(2) Solve the equation using the general steps for solving a linear equation.

【Solution】S: (1) Original equation $=-9+3\times\frac{2}{3}+(-8)\times(-1)$

$=-9+2+8$

$=1$

(2) S: $\frac{10-20x}{2}-\frac{10x+10}{5}=3$

$5x-10-(2x+2)=3$

$5x-10-2x-2=3$

$5x-2x=3+10+2$

$3x=15$

$x=5$.

21. (10 points) First simplify, than substitute: $2xy-\frac{1}{2}(4xy-8x^2y^2)+2(3xy-5x^2y^2)$, among them $x=\frac{1}{3}$, $y=-3$.

【Analyze】First remove the parentheses, then combine like terms, and finally substitute.

【Solution】S: $2xy-\frac{1}{2}(4xy-8x^2y^2)+2(3xy-5x^2y^2)$

$=2xy-2xy+4x^2y^2+6xy-10x^2y^2$

$=6xy-6x^2y^2$,

When $x=\frac{1}{3}$, $y=-3k$, original equation$=-6-6=-12$.

22. (10 points) When using aluminum sheets to make canned beverage bottles, each aluminum sheet can make 16 bottle bodies or 43 bottle bottoms. One bottle body is equipped with two

bottle bottoms. If there are 150 aluminum sheets, how many sheets are used to make bottle bodies and how many bottom sheets can be used to make a complete set of beverage bottles?

【Analyze】Suppose x pieces of aluminum sheets are used as the bottle body, then (150-x) pieces of aluminum sheets are used as the bottle bottom. Find the equivalence relationship between the aluminum sheets used for the body versus used for the bottoms.

【Solution】S: Suppose x pieces of aluminum sheets are used as the bottle body, then (150 - x) pieces of aluminum sheets are used as the bottom of the bottle,

From the problem: 2×16x=43×（150 - x）,

Solution: x=86.

Therefore 150 - 86=64 aluminum sheets would be used for bottle bottoms.

A: 86 aluminum sheets were used for bottle bodies, and 64 aluminum sheets were used for the bottle bottoms.

23. (10 points) In the spring outing of teachers and students of a school group, if each car takes 45 people, then there are 20 people left without seats; if each car takes 55 people, then there will be 30 empty seats. How many cars are there? How many students are there?

【Analyze】Suppose there is a total of x cars. From the information listed in the problem, find the equivalent value and use x to express.

【Solution】S: Assuming there is a total of x cars,

45x+20=55x - 30

10x=50

x=5

45×5+20=245 (people)

A: There is a total of 5 cars and 245 students.

24. (14 points) An iron ore terminal records the incoming iron ore as positive and the outgoing iron ore as negative. The records of a certain day are as follows: (unit: t)

0+100 · - 80 · +300 · +160 · - 200 · - 180 · +80 · - 160 ·

（1）Did iron ore inventories increase or decrease that day? How many tons were added or subtracted?

（2）The wharf transports iron ore with a large truck with a load capacity of 20t. The freight is 100 dollars each time. How much is the total freight cost on this day?

【Analyze】Clarify the meaning of "positive" and "negative".

【Solution】S: （1）According to the problem, the iron ore shipped in is recorded as positive, and the iron ore shipped out is recorded as negative.

Therefore (+100) + (－80) + (+300) + (+160) + (－200) + (－180) + (+80) + (－160) =+20，

That is, the iron ore inventory increased by 20 t on that day;

（2）The total weight of iron ore transported by a truck is: |+100|+|－80|+|+300|+|+160|+|－200|+|－180|+|+80|+|－160|=1260 (tons）

If the iron ore is transported by a truck with a load capacity of 20t,

Then the number of shipments required is 1260÷20=63

And will cost 100 dollars.

Therefore, the total freight required for this day is: 63×100=6300 (dollars).

25. (14 points) A speedboat travels downstream from Pier A to Pier B, while a cruise ship sails downstream from Pier B. It is known that the two piers A and B are 140 kilometers apart, the average speed of the speedboat in still water is 67 kilometers per hour, the average speed of the cruise ship in still water is 27 kilometers per hour, and the current speed is 3 kilometers per hour.

（1）Calculate the distance in kilometers between the two ships when they first set off and sailed for 30 minutes.

（2）If the speedboat returns immediately after arriving at Pier B, how long does it take for the two boats to become exactly 100 kilometers apart?

【Analyze】（1）Find the different speeds of both the cruise shup and speedboat.

（2）Discuss in two scenarios: ① When both boats are going down the river; ② When the speedboat returns to Pier B and the two boats travel in opposite directions; two equations can be obtained and solved.

【Solution】S:（1）140﹣（67+3）×$\frac{1}{2}$+（27+3）×$\frac{1}{2}$=120 kilometers.

That is, the distance between the two ships is 120 kilometers when sailing for 30 minutes;

（2）It is assumed that the distance between the two ships is 100 kilometers after departure x hours.

The first scenario: When the two ships are both going downstream:

140﹣（67+3）x+（27+3）x=100，

Simplified ﹣40x=﹣40,

Solution x=1.

That is, when both boats are going downstream, the distance between the two boats is 100 kilometers when they sail for 1 hour.

The second scenario: When the speedboat returns to Pier B, the two boats run opposite of each other.

∵ It takes 140÷(67+3)=2 hours for the speedboat to return from Pier A to Pier B.

From the problem we know: (67 - 3) × (x - 2) + (27+3) x=100 ·

Simplified, 94x=228,

Solution: $x=\frac{114}{47}$.

That is, when the two ships are traveling opposite each other, the distance between the two ships is 100 kilometers at the time of sailing hour.

To sum up, the two ships are exactly 100 kilometers apart from the departure at 1 hour and 114/47 hours.