2017-2018 7th Grade (I) Mid-term Mathematics Test Paper in Huoqiu County, Lu'an City, Anhui Province

One, multiple choice (10 questions, 4 points per question, full score 40 points)
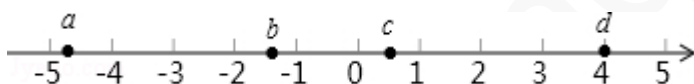
1. (4 points) On a rice sack, if it is recorded（10±0.1）kg then how heavy is the rice sack? (   )

A· （9.9～10.1）kg B· 10.1kg   C· 9.9kg   D· 10kg

2. (4 points) Which of the following calculation results would end up positive? (   )

A· 2 - 3   B· （- 3）^{2} C· 0× （- 2017）   D· - 3÷2

3. (4 points) Rational numbers a, b, c, and d are plotted on the number line as shown. Which of the following conclusions is correct? (   )

A· a＞- 4   B· bd＞0   C· |a|＞|b| D· b+c＞0

4. (4 points) Monomial $9x^m y^3$ and monomial $4x^2 y^n$ are like terms. What is m+n? (   )

A· 2 B· 3 C· 4 D· 5

5. (4 points) 18.5 billion written in scientific notation is (   )

A· $1.85×10^9$ B· $1.85×10^{10}$C· $1.85×10^{11}$D· $1.85×10^{12}$

6. (4 points) Which of the following equations are valid? (   )

A · $3a+2a^2=5a^3$ B · $a^2b - ab^2=0$

C · $2a^2bc - ba^2c=bca^2$ D · $2a^3 - 3a^3=a^3$

7. (4 points) A group of people are splitting the profits of a business. If one person gets seven dollars, there is four dollars left over; If one person gets nine dollars, there is nine dollars left over. Let x equal the number of people that are splitting profits. Choose the correct function used to describe the scenario. (   )

A · $7x+4=9x - 8$ B · $7x - 4=9x+8$ C · $7 (x+4) =9 (x - 8)$ D · $7 (x - 4) =9 (x+8)$

8. (4 points) This year, the price of chickens in a certain urban area dropped by a% this February compared to January. The price of chickens dropped by b% this March compared to February. If the price of chickens in January was 24 dollars/kg, and the price of chickens was m dollars/kg, then what is the equation used to describe this scenario? (   )

A · $m=24 (1 - a\% - b\%)$ B · $m=24 (1 - a\%) b\%$ C · $m=24 - a\% - b\%$ D · $m=24 (1 - a\%) (1 - b\%)$

9. (4 points) If a - b=2, and b - c= - 3, then a - c equals (   )

A · 1   B · - 1   C · 5   D · - 5

10. (4 points) Game chips are used to assemble the following pattern:
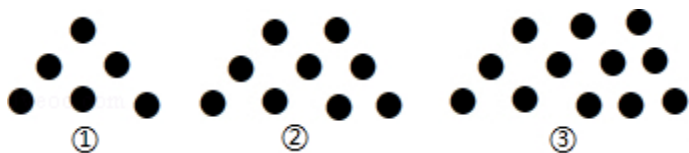
According to this pattern, the nth figure would have how many chips in it? (   )

A · 3n B · 6n C · 3n+6   D · 3n+3

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

11. (5 points) $\frac{1}{3}x^2y^2z$ is _____ degree monomial.

12. (5 points) Counting chips (a counting tool in the shape of a small stick) can be placed upright to indicate positive numbers, and diagonally placed to indicate negative numbers. As shown in the figure, according to this representation, observing Figure ①, it can be deduced that the value obtained in Figure ② is _____.

Represents   +1) + (-1) =0

②
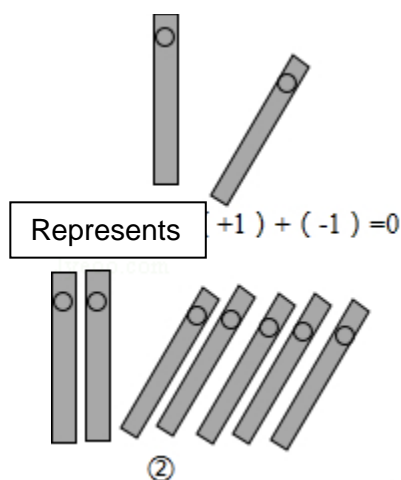
13. (5 points) x=1 is the solution to function 2x - a=0. Therefore, a equals_____ .

14. (5 points) As shown in the figure, this is a flow chart of an operation, input the value of a positive integer x, operate according to the flow chart and output the value of y. For example, if input x=10, output y=5. If the output y=3, the value of the input x is_____ .

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Start
  ↓
Input x
  ↓
Is even ──✔──→ /2 ──→ Output ──→ Finish
  ↓否                      y
  +1 ──────────────────────┘
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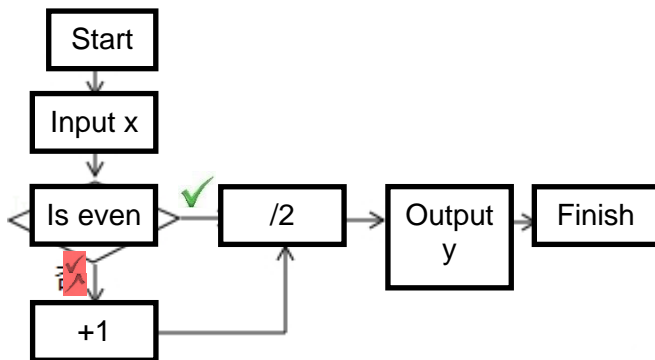
Three, short answer questions (9 questions, full score 90 points)

15. (8 points) Categorize the following rational numbers:

$- 3 \cdot 0.45 \cdot \frac{1}{2} \cdot 0 \cdot 9 \cdot - 1 \cdot - 1\frac{3}{4} \cdot 10 \cdot - 3.14$

(1) Positive integers: {_____...}

(2) Negative integers: {_____...}

(3) Integers: {_____ ...}

(4) Fractions: {_____ ...} ·

16. (8 points) Calculate:

(1) $3+ (-11) - (-9)$

(2) $(\frac{1}{2} - \frac{2}{3} + \frac{5}{6}) \div (-\frac{4}{3})$.

17. (10 points) If m is the greatest negative integer, and n is the absolute value of the smallest

rational number, c is a natural number that equals itself, and d has an opposite number of

$-\frac{1}{2018}$, find the value of algebraic expression $m^{2015}+2016n+c^{2017}+2018d$.
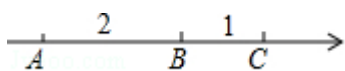
18. (10 points) Solve:

(1) $-3 (x - 2) = 4 - 2x$

(2) $\frac{x-1}{5} - \frac{3x-1}{10} = 1$.

19. (10 points) First simplify, then substitute: $(2a^2b - 5ab+1) - (3ab+2a^2b)$, among them a= -

3 . $b=\frac{1}{3}$.

20. (10 points) On an incomplete number line, there are points A, B, and C from left to right,

where the distance from A to B is equal to 2 unit lengths, and the distance from B to C is equal to

1 unit length, as shown in the figure. Let the sum of the rational numbers corresponding to the

points A, B, and C be p.

 (1) If B acts as the origin, write down the numbers that A and C each represent and calculate

the value of p; If C was the origin, what would p be?

(2) If origin O is right to point C, and the distance from C to O is 28 unit lengths, find p.


21. (10 points) Xavier's family bought a new house, and he is going to lay the floor tiles on the ground. The ground structure is shown in the figure. According to the following figure (unit: meters), answer the following questions:

(1) The area of the living room is_____m² ;

(2) Use an algebraic expression including x and y to find the total floor area of this house;

(3) When x=3.6 and y=2, if one 1m² of tiles costs 20 dollars, then what was the total cost for laying tiles?
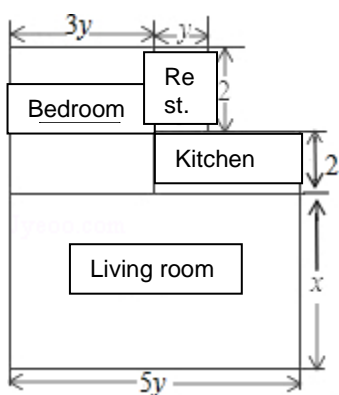
22. (12 points) We stipulate that the linear equation about x ax=b has a solution of b - a, making it a "difference solution equation", for example: 2x=4 has a solution of 2, and 2=4 - 2, so function 2x - 4 is a difference solution equation.

(1) Determine whether 3x=4.5 is a difference solution equation;

(2) If 5x=m+1 is a difference solution equation, find m.

23. (12 points) Starting from 2 and continuously add consecutive even numbers, the pattern can be listed below:

# of numbers being added n	Sum, S
1	2=1×2
2	2+4=6=2×3
3	2+4+6=12=3×4
4	2+4+6+8=20=4×5
5	2+4+6+8+10=30=5×6

(1) If n=8, then S equals_____ .

(2) The S of n can be written as: S=2+4+6+8+...+2n=_____ .

(3) According to the last question, 102+104+106+108+...+200 equals_____. (include your solution)

2017-2018 7th Grade (I) Mid-term Mathematics Test Paper in Huoqiu County, Lu'an City, Anhui Province

Answer Key

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

1. (4 points) On a rice sack, if it is recorded（10±0.1）kg then how heavy is the rice sack? （   ）

A·（9.9～10.1）kg B·10.1kg   C·9.9kg   D·10kg

【Analyze】According to the quality label on the rice packaging bag as "10 ± 0.1" kg, the qualified fluctuation range can be obtained, so that this question can be answered.

【Solution】S: ∵The rice sack is labeled "10±0.1" kilograms,

∴The fluctuation range is 9.9～10.1 kilograms,

Correct answer: A

2. (4 points) Which of the following calculation results would end up positive? （   ）

A·2﹣3   B·（﹣3）^{2} C·0×（﹣2017）   D·﹣3÷2

【Analyze】Calculate each of the options

【Solution】S: A, Original equation=﹣1, does not meet question requirements;

B、Original equation=9, does meet question requirements;

C、Original equation=0, does not meet question requirements;

D、Original equation= - 1.5, does not meet question requirements;

Correct answer: B

3. (4 points) Rational numbers a, b, c, and d are plotted on the number line as shown. Which of the following conclusions is correct? (   )
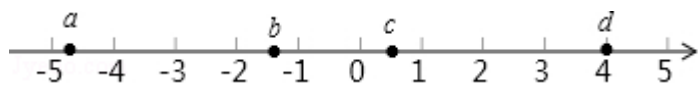
A · a> - 4   B · bd>0   C · |a|>|b| D · b+c>0

【Analyze】According to the positional relationship of the points on the number axis, the sizes of a, b, c, and d can be obtained. According to the operation of rational numbers and the properties of absolute values, the answer can be obtained.

【Solution】S: From the position of the point on the number line, we get

a< - 4<b<0<c<1<d ·

A、a< - 4, doesn't meet requirements；

B、bd<0, doesn't meet requirements；

C、∵|a|>4，|b|<2，∴|a|>|b|，meets requirements；

D、b+c<0，doesn't meet requirements;

Correct answer: C

4. (4 points) Monomial $9x^m y^3$ and monomial $4x^2 y^n$ are like terms. What is m+n? (   )

A·2 B·3 C·4 D·5

【Analyze】According to the definition of like terms, the values of m and n can be obtained. According to the addition of rational numbers, the answer can be obtained.

【Solution】S: From the question, we know,

m=2，n=3，

m+n=2+3=5，

Correct answer: D

5. (4 points) 18.5 billion written in scientific notation is (   )

A·1.85×10^9 B·1.85×10^{10} C·1.85×10^{11} D·1.85×10^{12}

【Analyze】The scientific notation rewrites numbers in the form $a \times 10^n$, with $1 \le |a| < 10$, and n being an integer.

Correct answer: B

6. (4 points) Which of the following equations are valid? (   )

A．$3a+2a^2=5a^3$ B．$a^2b - ab^2=0$

C．$2a^2bc - ba^2c=bca^2$ D．$2a^3 - 3a^3=a^3$

【Analyze】According to the method of combining like terms, the coefficients of like terms is added together.

【Solution】S: A, 3a, and $2a^2$ are not like terms and cannot be combined, option A is incorrect；

B、a^2b and - ab^2 are not like terms and cannot be combined, option B is incorrect;

C、$2a^2bc - ba^2c=bca^2$. option C is correct;

D、$2a^3 - 2a^3=0$, option D is incorrect;

Correct answer: C

7. (4 points) A group of people are splitting the profits of a business. If one person gets seven dollars, there is four dollars left over; If one person gets nine dollars, there is nine dollars left over. Let x equal the number of people that are splitting profits. Choose the correct function used to describe the scenario. (   )

A · 7x+4=9x - 8   B · 7x - 4=9x+8   C · 7 (x+4) =9 (x - 8)   D · 7 (x - 4) =9 (x+8)

【Analyze】Write functions according to equivalent values found in the problem.

【Solution】S: The function can be written as: 7x+4=9x - 8

Correct answer: A

8. (4 points) This year, the price of chickens in a certain urban area dropped by a% this February compared to January. The price of chickens dropped by b% this March compared to February. If the price of chickens in January was 24 dollars/kg, and the price of chickens was m dollars/kg, then what is the equation used to describe this scenario? (   )

A · m=24 (1 - a% - b%)   B · m=24 (1 - a%) b%   C · m=24 - a% - b%   D · m=24 (1 - a%) (1 - b%)

【Analyze】First find the price of chickens in February, and then find the price of chickens in March according to the b% decrease in March compared with February.

【Solution】S: ∵ The price of chickens in February this year dropped by a% compared with January. The price of chickens in January was 24 yuan/kg.

∴The price of chickens in February cost 24 (1 - a%) ·

∵The price of chickens in March dropped by b% compared to February,

∴ The price of chickens in March is 24 (1 - a%) (1 - b%) ·

Correct answer: D
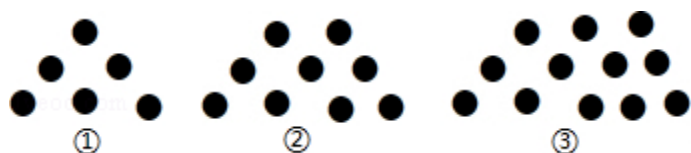
9. (4 points) If a‑b=2, and b‑c=‑3, then a‑c equals (　　　)

A·1　B·‑1　　　C·5　D·‑5

【Solution】S: ∵a‑b=2，b‑c=‑3，

∴a‑c=（a‑b）+（b‑c）=2‑3=‑1，

Correct answer: B

10. (4 points) Game chips are used to assemble the following pattern:

According to this pattern, the nth figure would have how many chips in it?　(　　　)

A·3n　B·6n　C·3n+6　　　D·3n+3

【Analyze】To solve this type of problem, we should start with simple figures, and find the patterns of how the figures change. After that, we draw a conclusion and apply it to the scenario asked for.

【Solution】S: ∵In figure one, there was a total of 3+3=6 chips;

Figure two's number of chips was 3×2+3=9 ;

Figure three's number of chips was 3×3+3=12；

...

∴The nth figure will have 3n+3 chips.
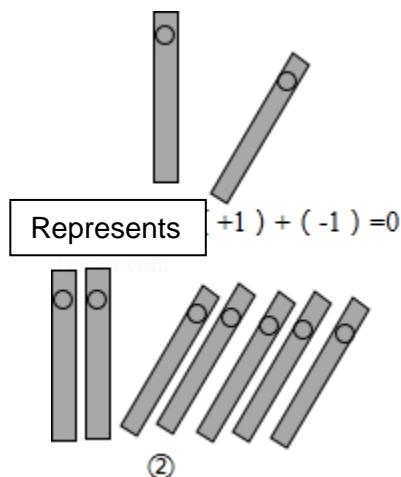
Correct answer: D

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

11. (5 points) $\frac{1}{3}x^2y^2z$ is ___5___ degree monomial.

【Solution】S: 2+2+1=5，

Correct answer: 5

12. (5 points) Counting chips (a counting tool in the shape of a small stick) can be placed upright to indicate positive numbers, and diagonally placed to indicate negative numbers. As shown in the figure, according to this representation, observing Figure ①, it can be deduced that the value obtained in Figure ② is ___-3___.

Represents | +1) + (-1) =0

②

【Analyze】 According to the rules of addition between rational numbers, we can find the answer.

【Solution】 S: Figure ② represents (+2) + (- 5) = - 3,

Correct answer: - 3

13. (5 points) x=1 is the solution to function 2x - a=0. Therefore, a equals__2__.

【Analyze】 Take x=1 and substitute it into the function, finding the value of a.

【Solution】 S: Substitute x=1 into function and we get: 2 - a=0,

Our solution is a=2,

Correct answer: 2

14. (5 points) As shown in the figure, this is a flow chart of an operation, input the value of a positive integer x, operate according to the flow chart and output the value of y. For example, if input x=10, output y=5. If the output y=3, the value of the input x is__5 or 6__ .

```
Start
  ↓
Input x
  ↓
Is even ──✓──→ /2 ──→ Output ──→ Finish
  │                      y
  ↓ ✗
 +1 ──────────────┘
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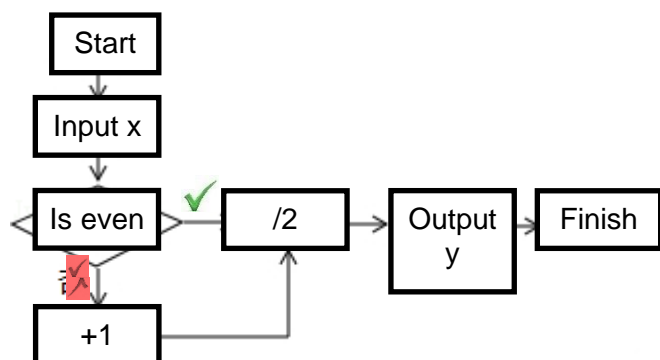
【Analyze】According to the operation flow chart, the value of x can be determined according to the value of output y.

【Solution】S: If x is even, we get $\frac{1}{2}x=3$, so x=6 ;

If x is odd, we get $\frac{1}{2}$ (x+1) =3, so x=5,

Correct answer: 5 or 6

Three, short answer questions (9 questions, full score 90 points)

15. (8 points) Categorize the following rational numbers:

- 3 · 0.45 · $\frac{1}{2}$ · 0 · 9 · - 1 · - 1$\frac{3}{4}$ · 10 · - 3.14

(1) Positive integers: {___9, 10___...}

(2) Negative integers: {___-3, -1___...}

(3) Integers: {___-3, -1, 0, 9, 10___...}

(4) Fractions: {___0.45, ½, 1 ¾, -3.14___...} ·

【Analyze】According to the categorization of rational numbers, we get find the answer.

【Solution】S: (1) Positive integers: {9 · 10   ...}

(2) Negative integers: { - 3 · - 1   ...}

(3) Integers: { - 3 · - 1 · 0 · 9 · 10   ...}

(4) Fractions: { 0.45 · $\frac{1}{2}$ · - 1$\frac{3}{4}$ · - 3.14   ...} ·

Correct answer: 9 · 10 ; - 3 · - 1 ; - 3 · - 1 · 0 · 9 · 10 ; 0.45 · $\frac{1}{2}$ · - 1$\frac{3}{4}$ · - 3.14 ·

16. (8 points) Calculate:

(1) 3+ (- 11) - (- 9)

(2) $(\frac{1}{2} - \frac{2}{3} + \frac{5}{6}) \div (-\frac{4}{3})$.

【Analyze】(1) This problem can be solved by adding and subtracting rational numbers;

(2) First convert division into multiplication, and then solve this problem according to the distributive law of multiplication.

【Solution】S: (1) 3+ (- 11) - (- 9)

=3+ (- 11) +9

=1 ;

(2) $(\frac{1}{2} - \frac{2}{3} + \frac{5}{6}) \div (-\frac{4}{3})$

= $(\frac{1}{2} - \frac{2}{3} + \frac{5}{6}) \times (-\frac{3}{4})$

= $\frac{1}{2} \times (-\frac{3}{4}) - \frac{2}{3} \times (-\frac{3}{4}) + \frac{5}{6} \times (-\frac{3}{4})$

= $-\frac{3}{8} + \frac{1}{2} + (-\frac{5}{8})$

= $-\frac{1}{2}$.

17. (10 points) If m is the greatest negative integer, and n is the absolute value of the smallest rational number, c is a natural number that equals itself, and d has an opposite number of $-\frac{1}{2018}$, find the value of algebraic expression $m^{2015} + 2016n + c^{2017} + 2018d$.

【Analyze】From the problem, we know that m= - 1, n=0, c=1, $d=\dfrac{1}{2018}$, so the answer can be obtained from substitution.

【Solution】S: From the problem: m= - 1，n=0，c=1，$d=\dfrac{1}{2018}$，

So $m^{2015}+2016n+c^{2017}+2018d=(-1)^{2015}+2016\times 0+1^{2017}+2018\times\dfrac{1}{2018}$

= - 1+0+1+1

=1．

18. (10 points) Solve:

（1） - 3（x - 2）=4 - 2x

（2）$\dfrac{x-1}{5}-\dfrac{3x-1}{10}=1$．

【Analyze】（1）Remove brackets, combining like terms, coefficient of x → 1

（2）Remove brackets, combining like terms, coefficient of x → 1

【Solution】（1）S: After removing brackets, - 3x+6=4 - 2x．

Getting x onto one side, - 3x+2x=4 - 6．

Combining like terms, - x= - 2．

Solution, x=2；

(2) S: Removing denominators, 2 (x - 1) - (3x - 1) =10 ·

Removing brackets, 2x - 2 - 3x+1=10 ·

Getting x onto one side, 2x - 3x=10+2 - 1 ·

Combining like terms, - x=11 ·

Solution x=30 ·

19. (10 points) First simplify, then substitute: $(2a^2b - 5ab+1) - (3ab+2a^2b)$, among them $a= - 3$ · $b=\frac{1}{3}$ ·

【Solution】S: Original equations$=2a^2b - 5ab+1 - 3ab - 2a^2b$

$= - 8ab+1$ ·

When $a= - 3$ and $b=\frac{1}{3}$,

Original equation$=8+1=9$ ·

20. (10 points) On an incomplete number line, there are points A, B, and C from left to right, where the distance from A to B is equal to 2 unit lengths, and the distance from B to C is equal to 1 unit length, as shown in the figure. Let the sum of the rational numbers corresponding to the points A, B, and C be p.

(1) If B acts as the origin, write down the numbers that A and C each represent and calculate the value of p; If C was the origin, what would p be?

(2) If origin O is right to point C, and the distance from C to O is 28 unit lengths, find p.
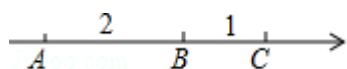
【Analyze】 (1) First find the numbers corresponding to A, B, and C according to the meaning of the question, and then find p;

(2) First find the numbers corresponding to A, B, and C according to the meaning of the question, and then find p;

【Solution】 S: (1) With B as the origin, points A and C each correspond to the numbers - 2 and 1 · p= - 2+0+1= - 1 ;

With C as the origin, points A and B each correspond to the numbers - 3 · - 1 · p= - 3+ (- 1) +0= - 4 ;

(2) If O is right of C on the number line, and C is 28 units from O,

Then point A corresponds to - 28 - 1 - 2= - 31, point B corresponds to - 28 - 1= - 29, point C corresponds to - 28 · so p= (- 28 - 1 - 2) + (- 28 - 1) + (- 28) = - 88 ·

21. (10 points) Xavier's family bought a new house, and he is going to lay the floor tiles on the ground. The ground structure is shown in the figure. According to the following figure (unit: meters), answer the following questions:

（1）The area of the living room is___5xy___m² ;

（2）Use an algebraic expression including x and y to find the total floor area of this house;

（3）When x=3.6 and y=2, if one 1m² of tiles costs 20 dollars, then what was the total cost for laying tiles?
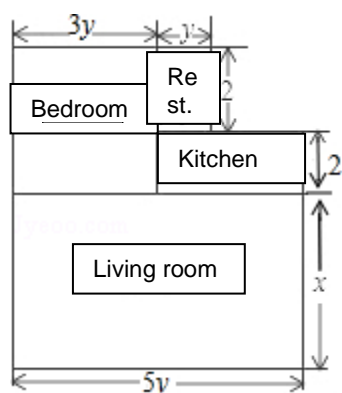
【Analyze】（1）According to the data in the graph, the area of the living room can be expressed by algebra;

（2）According to the data in the graph, the area of this house can be expressed by algebra;

（3）Substitute the values of x and y into the algebraic formula in (2), find the value of the algebraic formula and multiply it by 20 to solve this problem.

【Solution】S：（1）

The area of the living room is 5y•x=5xy（m²）·

Correct answer: 5xy；

（2）The total area of the floor: 5y•x+3y×（2+2）+2y+2×（5y - 3y）=5xy+12y+2y+4y=5xy+18y（m²）·

A: The total area of the floor is（5xy+18y）m²；

（3）When x=3.6 and y=2,

5xy+18y=5×3.6×2+18×2=72（m²）·

If every 1m² of tiles cost 20 dollars, then the total amount of money spent on laying tiles would be 72×20=1440（dollars）·

A: The total cost spent on titles is 1440 dollars.

22. (12 points) We stipulate that the linear equation about x ax=b has a solution of b - a, making it a "difference solution equation", for example: 2x=4 has a solution of 2, and 2=4 - 2, so function 2x - 4 is a difference solution equation.

（1）Determine whether 3x=4.5 is a difference solution equation;

（2）If 5x=m+1 is a difference solution equation, find m.

【Analyze】（1）Find the solution of the equation

（2）According to the difference solution equation, the equation about m can be obtained, and the solution of the equation can be obtained.

【Solution】S: （1）∵3x=4.5，

∴x=1.5，

∵4.5－3=1.5，

∴3x=4.5 is the function;

（2）∵ The linear equation 5x=m+1 about x is a differential equation,

∴m+1－5=$\frac{m+1}{5}$，

Solution: m=$\frac{21}{4}$，

The value of m is $\frac{21}{4}$．

23. (12 points) Starting from 2 and continuously add consecutive even numbers, the pattern can be listed below:

# of numbers	Sum, S

being added N	
1	2=1×2
2	2+4=6=2×3
3	2+4+6=12=3×4
4	2+4+6+8=20=4×5
5	2+4+6+8+10=30=5×6

（1）If n=8, then S equals___7s___ .

（2）The S of n can be written as: S=2+4+6+8+…+2n=___n(n+1)___ .

（3）According to the last question, 102+104+106+108+…+200 equals_____. (include your solution)

【Analyze】（1）According to the patterns obtained from the table, it is found that if n=8, the value of S is 8×9, and its value can be obtained;

（2）From the pattern, we know that the pattern is n（n+1）;

（3）First of all, determine how many addends there are. From the above pattern, we can get: the number of addends is the last addend ÷ 2, and solve accordingly.

【Solution】S:（1）When n=8, S=8×9=72；

Correct answer: 72 ;

（2）According to the special formula, the pattern can be found, S=2+4+6+8+…+2n=2

（1+2+3+…+n）=n（n+1）;

Corerct answer: n（n+1）;

（3）102+104+106+…+200

=（2+4+6+…+102+…+200）- （2+4+6+…+100）

=100×101 - 50×51

=7550 .