2017-2018 7th Grade Math Last Semester Exams

Math Exam

(90-minute test, full score 120 points)

One, multiple choice (12 questions, 3 points per question, full score 36 points)

1. $|-2|$ equals ( )

A · -2 B · $-\frac{1}{2}$ C · 2 D · $\frac{1}{2}$

2. To fix a horizontal wooden bar on a wall, the least number of nails required is ( )

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

3. Which of the following is a one-dimensional linear equation? ( )

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

4. From the following pairs of numbers, which two numbers are opposite numbers? ( )

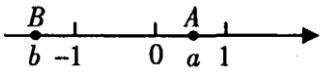
A. $-(-1)$ and 1 B. $(-1)^2$ and 1 C. $|-1|$ and 1 D. -1^2 and 1

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

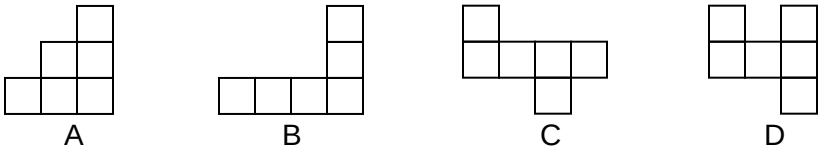
A · a^3 与 a^2 B · $\frac{1}{2}a^2$ 与 $2a^2$ C · $2xy$ 与 $2x$ D · -3 与 a

6. As shown, points A, B each represent numbers a, b. Which of the following relationships are true? ( )

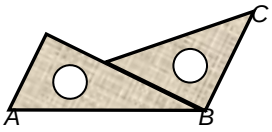
A · $a+b>0$ B · $ab>0$ C · $\frac{1}{a}-\frac{1}{b}<0$ D · $\frac{1}{a}+\frac{1}{b}>0$



7. As shown, which of the nets can be made into a cube? ( )

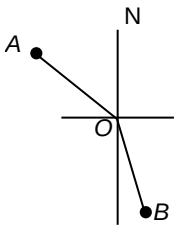


8. Put the two triangular boards together as shown, then $\angle ABC$ equals ( )



A · 70° B · 90° C · 105° D · 120°

9. At the lighthouse O, it is observed that the ship A is located in the direction of 54° west of north, and the ship B is in the direction of 15° east of south, then the measure of ∠AOB is ( )



A · 69° B · 111° C · 141° D · 159°

10. A jacket is first priced at a 50% increase in cost, and then sold at a 20% discount (80% of the listed price), resulting in a profit of 28 dollars. If the cost of this jacket is x dollar, the function that can be written is ( )

A. (1 + 50%) x×80% = x - 28 B. (1 + 50%) x×80% = x + 28

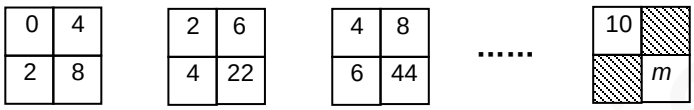
C · (1 + 50%x) ×80% = x - 28 D. (1 + 50%x) ×80% = x + 28

11. The ship travels downstream from port A to port B along the river, and it takes 3 hours less than returning from port B to port A. If the speed of the ship is 26 km/h and the water speed is 2 km/h, find the distance between port A and port B in kilometers. Let the distance between port A and port B be represented as x km. The equation that can be listed is （ ）

A. $\frac{x}{28}=\frac{x}{24}-3$　　B. $\frac{x}{28}=\frac{x}{24}+3$

C. $\frac{x+2}{26}=\frac{x-2}{26}+3$　　D. $\frac{x-2}{26}=\frac{x+2}{26}-3$

12. From the pattern below, what is the value of m? （ ）



A · 110　　B · 158　　C · 168　　D · 178

Two, fill in the blanks (8 questions, 3 points per question, full score 24 points)

13. - 3 has a reciprocal of _____ ·

14. Monomial $-\frac{1}{2}xy^2$ has a coefficient of _____ ·

15. If x = 2 is the solution to 8 - 2x=ax, then a=_____ ·

16. Calculate: 15°37′+42°51′=_____ ·

17. A plateau has an area of 2,500,000 square kilometers. 2,500,000 in scientific notation is _____.

18. Given $a - b = 2$, then $2a - 2b+5=$_____ .

19. Given that $y_1=x+3$, $y_2=2 - x$, when $x =$_____, y_1 is 5 more than y_2.

20. According to the figure below, the price of one cup is $_____.

Total $43

Total $94

Three, short answer questions (8 questions, full score 60 points)

21. (6 points) Calculate: $(-1)^3 - \frac{1}{4}\times[2-(-3)^2]$.

22. (6 points) The complementary angle of an angle is 30° less than that of this angle. Calculate the measure of this angle.

23. (7 points) First simplify, then substitute: $\frac{1}{4}(-4x^2+2x-8)-(\frac{1}{2}x-1)$, $x=\frac{1}{2}$.

24. (7 points) Solve for x: $\frac{5x+1}{3} - \frac{2x-1}{6} = 1$.

25. (7 points) Point A starts on 2 on the number line. In the first scenario, it shifts 1 unit to the left and 2 units to the right; In the second scenario, it shifts 3 units to the left, and shifts right 4 units; In the third scenario, it shifts left 5 units, then goes right 6 units……

(1) After the first scenario, point A is representing _____ ;

(2) After the second scenario, point A is representing _____ ;

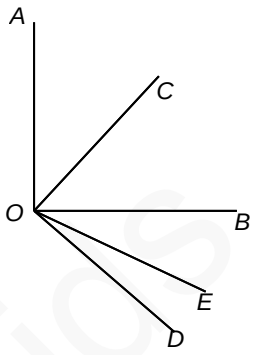
(3) After the fifth scenario, point A is representing _____ ;

(4) After the nth scenario, point A is representing _____ ;

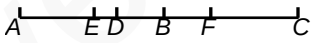
(5) If after the mth scenario the number point A is representing is 56, find m.

26. (8 points) As shown, $\angle AOB = \angle COD = 90°$. OC bisects $\angle AOB$, $\angle BOD = 3\angle DOE$.

Find $\angle COE$.



27. (8 points) As shown, $BD=\frac{1}{3}AB=\frac{1}{4}CD$. Line segments *AB and CD* have midpoints of *E, F.* The distance from E to F is 10cm, find the lengths of *AB* and *CD*.



28. (11 points) In order to commend the students who, have outstanding achievements in the calligraphy competition, a middle school purchased 30 pens and 45 brushes, which cost $1,755, of which each brush was $4 more expensive than a pen.

(1) How much was each pen and brush?

(2) ① The school still needs to purchase a total of 105 of the two types above (the unit price of each type remains unchanged). After Mr. Brown made the budget, he said to Mr. Smith of the

Finance Department: “This time, I need $2447 to pay for these pens and brushes.” Mr. Smith thought for a moment, calculating, and said: “If you’ll use the money for buying just the pens and brushes, then the account must be wrong.” Please use functions to explain what Mr. Brown said wrong.

② Mr. Brown suddenly remembered that the budget also included a signature pen that the principal asked him to buy. If the unit price of the signature pen is an integer less than $10, what is the unit price of a signature pen?

Answer Key

One, multiple choice (12 questions, 3 points per question, full score 36 points)

1 · C ; 2 · B ; 3 · A ; 4 · D ; 5 · B ; 6. D ; 7 · C ; 8 · D ; 9 · C ; 10. B ; 11 · A ; 12 · B.

Two, fill in the blanks (8 questions, 3 points per question, full score 24 points)

13 · $-\frac{1}{3}$; 14 · $-\frac{1}{2}$; 15 · 2 ; 16 · 58°28′ ; 17 · 2.5×10^{6} ; 18 · 9 ; 19 · 2 ; 20 · 8.

Three, short answer questions (8 questions, full score 60 points)

21. S: Original Equation = $-1-\frac{1}{4}\times(2-9)$ ...3 points

$=-1+\frac{7}{4}$ ...5 points

$=\frac{3}{4}$ ...6 points

22. S: Let the measure of this angle be *x*. .....1 point

$\frac{1}{2}x-(90^{\circ}-x)=30$ ...3 points

Simplified: x=80.....5 points

Answer: The measure of this angle is 80° .....6 points

23. S: Original equation = $-x^{2}+\frac{1}{2}x-2-\frac{1}{2}x+1$.....3 points

$=-x^{2}-1$ ...4 points

After substituting $x=\frac{1}{2}$: Original equation $=-x^2-1=-(\frac{1}{2})^2-1$...5 points

$=-\frac{5}{4}$ 7 points

24. S: $2(5x+1)-(2x-1)=6$. ...2 points

$10x+2-2x+1=6$.....4 points

$8x=3$. .....6 points

$x=\frac{3}{8}$.....7 points

25. S: (1) 3 .....1 point

(2) 4 .....2 points

(3) 7 .....3 points

(4) n+2 .....5 points

(5) 54 .....7 points

26. S: ∵$\angle AOB$=90°, OC bisecting $\angle AOB$

∴$\angle BOC=\frac{1}{2}\angle AOB$=45°, ...2 points

∵$\angle BOD=\angle COD-\angle BOC$=90° - 45°=45° · .....4 points

$\angle BOD$=3$\angle DOE$

∴$\angle DOE$=15 · .....7 points

$\therefore \angle COE = \angle COD - \angle DOE = 90° - 15° = 75°$ .....8 points

27. S: Let $BD = x$ cm, then $AB = 3x$cm, $CD = 4x$ cm, $AC = 6x$ cm. .....1 point

∵ Points E and F are the midpoints of AB and CD,

$\therefore AE = \frac{1}{2} AB = 1.5x$ cm, $CF = \frac{1}{2} CD = 2x$ cm.....3 points

$\therefore EF = AC - AE - CF = 2.5x$ cm. .....4 points

∵ EF=10cm,

$\therefore 2.5x$=10, solve: x=4 · .....6 points

$\therefore AB$ = 12c, CD = 16cm.....8 points

28. S: (1) Let the cost of each pen worth x dollars, causing the cost of each brush to be worth (x + 4) dollars .....1 point

From the question: $30x+45(x+4)=1755$ .....3 points

Solution: x = 21

Then x + 4 = 25. .....4 points

S: The cost of each pen is 21 dollars; the cost of each brush is 25 dollars. .....5 points

(2) Let there be y pens costing $21, so there'd be 25 brush that each cost (105 - y ...6 points

So, $21y+25(105-y)=2447$. ...7 points

Solution: y = 44.5 (not matching to the question) ....8 points

Therefore, Mr. Brown got something wrong. ...9 points

(3) 2 or 6. .....11 points

〖1 point is given for 1 correct answer, 1 point is deducted for 1 wrong answer, until deducted to 0 points〗

28. (3) S: Let there be z pens each costing 21 dollars, each signature pen costing a dollars

From the problem, 21z + 25(105 - z) = 2447 - a.

4z=178+a, because a, z are both whole numbers, and 178+a is divisible by 4,

So, a is an even number. Also, because that a is an integer less than 10 dollars, so a can be 2, 4, 6, 8.

When a=2, 4z = 180, z = 45, which does makes sense;

When a=4, 4z = 182, z = 45.5, which doesn't make sense;

When a=6, 4z = 184, z = 46, which does make sense;

When a=8, 4z = 186, z = 46.5, which doesn't make sense;

So the unit price of a notebook could either be 2 dollars or 6 dollars.

〖This question can also be answered by looking at the result of ①, and the answer can be obtained by discussing the unit price of a pen〗