Shanghai Pudong New Area 2017-2018 School Year Seventh Grade Mathematics Mid-term Quality Exam Questions

(90 minute-test, full score 100 points)

Section	One	Two	Three	Four	Total
Points					

One, multiple choice: (Total, 6 questions, 2 points per question, full score 12 points)

1. The opposite number of the sum of x and y can be expressed as.. (   )

(A) $x+\frac{1}{y}$; (B) $\frac{1}{x+y}$; (C) $-\frac{1}{x+y}$; (D) $-(x+y)$.

2. In the following monomials, the unlike pair is.. (   )

(A) 8 and $\frac{1}{8}$ (B) xy and $-\frac{1}{2}xy$

(C) mb^2 and ${}^{1}/_{2}\,mb^2$ (D) $(xy^2)^2$ and $-\frac{1}{2}x^2y^4$

3. In the following, how much calculations are wrong? ....( )

(1) $(a+b)(a^2+ab+b^2)=a^3+b^3$; (2) $(a-b)(a^2+ab+b^2)=a^3-b^3$;

(3) $(2a-3b)^2=2a^2-12ab+3b^2$; (4) $\frac{1}{2}(4a-1)^2=8a^2-8a+\frac{1}{2}$;

(A) 1 (B) 2 (C) 3 (D) 4

4. From the following, the one multiplied with $-x-y$ that equal x^2-y^2 is.................... ( )

(A) $y-x$ (B) $x-y$ (C) $x+y$ (D) $-x-y$

5. When $x=1$, expression $px^3+qx+1=2017$; When $x=-1$, expression px^3+qx+1 is equal to .... ( ) ·

(A) - 2015 (B) - 2016 (C) - 2018 (D) 2016

6. of $2^{101}\times0.5^{100}$, simplified, gives .... ( )

(A) 1 (B) 2 (C) 0.5 (D) 10

Two, fill in the blanks. (Total, 12 questions, 3 points per question, full score 36 points)

7. Use an expression: the sum of y raised to the 2nd power and x is_______;

8. When $x=1, y=-2$, algebraic expression $2x+7y$ equals_______;

9. $-\frac{x^2y}{7}$ is a ____ (cubic/quadratic) monomial, its coefficient is_______;

10. Polynomial $x+2x^2-7$, ordered from the power of x, is____________;

11. It is given that $3x^{n+1}y^4$ and $\frac{1}{2}x^3y^{m-2}$ are like terms, then $m+n=$_______;

12. $(-2)^5$ has a base number of _____; Its index is _____;

13. $(a^2)^3=$_______;

14. $8x\cdot\frac{2}{7}x=$_______;

15. If $a^n = 2, a^m = 5, then\ a^{m+n} =$__________, $a^{2n} =$ _____ .

16. Use the Product of Sum and Difference formula to solve $8.1 \times 7.9 = \left(8 + \frac{1}{10}\right) \cdot (\qquad\qquad) =$ _____.

17. Given that $a + b = 2$, $ab = -2$, then $(a-b)^2 =$____________

18. Observe the following expressions: x · $-2x^2$, $4x^3$, $-8x^4$,... using your pattern the *n*th monomial would be_____ .

Three, short answer questions (Total, 5 questions, 6 points per question, full score 30 points)

19. Simplify: $2x - 7(7x - 2y) - 2(x + 6y)$.

20. Simplify: $x \cdot x^2 \cdot x^3 \cdot x^4 + (x^2)^5 + (x^5)^2$.

21. Simplify: $(1 - x)(1 + x)(1 + x^2)(1 + x^4)(1 + x^8)$.

22. Simplify: $(2x+y-3)(2x-y+3)$.

23 · Find the difference of $\frac{1}{2}x^2-2xy+\frac{1}{3}$ and $-\frac{2}{3}x^2+xy-\frac{2}{3}$.

Four, long answer questions: (Questions 24, 25, 26 are 6 points each, question 27 is 4 points, full score 22)

24. First simplify, then calculate: $x\left(x^2-x-\frac{1}{3}\right)+2\left(x^2+2\right)-\frac{1}{3}x\left(3x^2+6x-1\right)$, $x=-3$.

25 · Observe the following equations:

$12 \times 231 = 132 \times 21$,

$13 \times 341 = 143 \times 31$,

$23 \times 352 = 253 \times 32$,

$34 \times 473 = 374 \times 43$,

$62 \times 286 = 682 \times 26$,

…

Out of the equations above, the numbers on both sides of each equation are symmetrical, and the numbers that make up two-digit and three-digit numbers in each equation have the same rules. We call this type of equation a "digital symmetric equation".

(1) Fill in the blanks according to the rules repeated in the equations above:

①52×____=____×25；

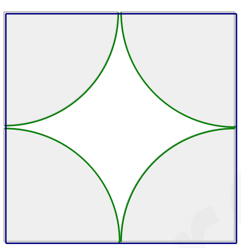
② ____×396=693×____.

(2) Let the tens digit on the left side of this type of equation be a, and the ones digit be b. $2 \le a + b \le 9$. Write the formula representing the pattern of "digital symmetry equations" (using a, b).

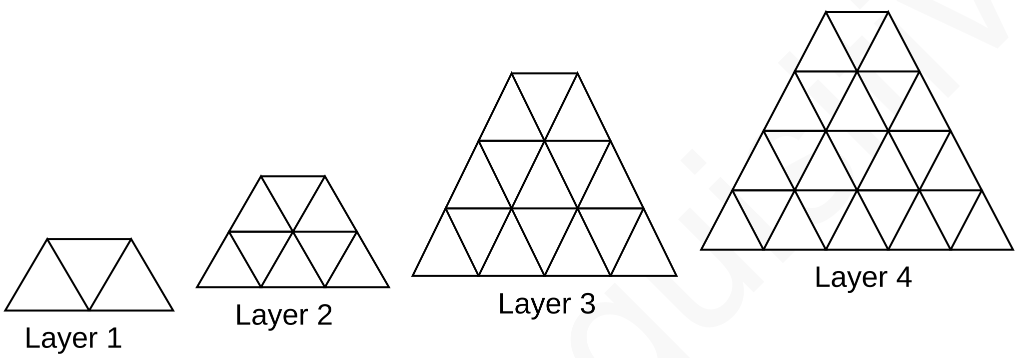
26. In art class, students are collaborating to make a solar system poster. A group of students are starting to prepare star-shaped pieces of paper. They first cut out four equal in area sectors from a square piece of paper to get the figure (removing the shaded parts as shown), and then painted it with different colors to get a star.

(1) If the side length of the square is a , use a in an expression to express the area of one paper star;

(2) If the side length of the square is 4 cm, and the goal is to make 50 of these stars. Each student needs 2 seconds to paint one 1square cm of paper. If there are two students in charge of making the 50 stars, how long will it take? (π is 3.14)



27. As shown, several small wooden sticks of equal length are used to form a trapezoid. Fill in the blanks according to the pattern.



...

Layer #	1	2	3	4	...	N

Number of triangles formed	$3 = 2^2 - 1$	$8 = 3^2 - 1$	$15 = 4^2 - 1$		…	
Number of wooden sticks used	$3(1+2)-2$ =7	$3(1+2+3)-2$ =16	$3(1+2+3+4)-2$ =28		…	

Answer Key

One, multiple choice: (Total, 6 questions, 2 points per question, full score 12 points)

1. D； 2. C； 3. C；4. A； 5. A; 6. B

Two, fill in the blanks. (Total, 12 questions, 3 points per question, full score 36 points)

7. y^2+x; 8. -12; 9. $3,-\frac{1}{7}$; 10. $2x^2+x-7$; 11. 8； 12. $-2,5$; 13. a^6; 14. $\frac{16}{7}x^2$; 15.10,4; 16. 8-1/10, 63 99/100, or 63.9917; 12; 18. $(-2)^{n-1}x^n$.

Three, short answer questions (Total, 5 questions, 6 points per question, full score 30 points)

19. Original equation = $2x-49x+14y-2x-12y$ ------------------2 points

$=(2-49-2)x+(14-12)y$ -----------------2 points

$=-49x+2y$ --------------------2 points

20. Original Equation $=x^{1+2+3+4}+x^{10}+x^{10}$ ------------------3 points

$=x^{10}+2x^{10}$ --1 point

$=3x^{10}$ --------------------- ---------------------------2 points

21. Original Equation $=(1-x^2)(1+x^2)(1+x^4)(1+x^8)$ -----------1 point

$=(1-x^4)(1+x^4)(1+x^8)$ ------------------2 points

$=(1-x^8)(1+x^8)$ ---------------------------2 points

$=1-x^{16}$ --------------------------------------1 point

22. Original Equation $=[2x+(y-3)]\cdot[2x-(y-3)]$ ....2 points

$=(2x)^2-(y-3)^2$ ....1 point

$=4x^2-(y^2-6y+9)$ ....2 points

$=4x^2-y^2+6y-9$ ....1 point

23. Solution : $\frac{1}{2}x^2-2xy+\frac{1}{3}-\left(-\frac{2}{3}x^2+xy-\frac{2}{3}\right)$ ....2 points

$=\frac{1}{2}x^2-2xy+\frac{1}{3}+\frac{2}{3}x^2-xy+\frac{2}{3}$ ....2 points

$=\frac{7}{6}x^2-3xy+1$ ....2 points

Four, long answer questions: (Questions 24, 25, 26 are 6 points each, question 27 is 4 points, full score 22)

24. Solution: Original Equation $=x^3-x^2-\frac{x}{3}+2x^2+4-x^3-2x^2+\frac{x}{3}$ ....2 points

$=-x^2+4$ ....1 point

Substitute $x=-3$, $-(-3)^2+4$ ....2 points

$=-5$ ....1 point

25. Solution: (1) ① 275 ; 572 ; .... (2 points)

② 63 ; 36 ; ....(2 points)

(2) $(10a+b)\times[100b+10(a+b)+a]=[100a+10(a+b)+b]\times(10b+a)$ ....(2 points)

26. Solution: (1) $a^2-\pi(\frac{a}{2})^2$ or $a^2-4\times\frac{90}{360}\pi(\frac{a}{2})^2$ or $a^2-\frac{\pi\cdot a^2}{4}$ are all worth 2 points

(2) When $a=4$, $\pi=3.14$

Original Equation = $4^2-3.14\times(\frac{4}{2})^2$ ....1 point

=3 · 44 (square cm) ....1 point

3. 44×50=172 (seconds) ....1 point

Answer: Two students making 50 stars takes 172 seconds......1 point

27. (Every square = 1 point)

	$24=5^2-1,$	$(n+1)^2-1$
	$3(1+2+3+4+5)-2=43$	$3(1+2+\cdots+(n+1))-2$ $=\frac{3}{2}n^2+\frac{9}{2}n+1$