Arithmetic Reasoning

1. Family Video stocks 1003 drama movies, 518 science fiction movies and 253 children's movies. How many more drama titles than children's titles does Family Video have in stock?

A. 750
B. 1003
C. 485
D. 265

Answer: A. 750
There are 1003 drama movies and 253 children's movies. So Family Video has 1003 – 253 = 750 more drama titles than children's titles.

2. Mr. Vlasic needs to buy 2 pens each for the 17 students in his class. If pens come in packs of 6 and each pack costs $2.35, what is the minimum amount that Mr. Vlasic must spend?

A. $11.75
B. $14.10
C. $7.05
D. $15.00

Answer: B. $14.10
Mr. Vlasic needs to but 34 pens in all. Since the pens come in packs of 6, Mr. Vlasic must buy at least 6 packs (36 pens) in order to have enough pens for all his students. So Mr. Vlasic must spend at least $6 \times \$2.35 = \$14.10$.

3. Brandon earns $1,050 a week and Brad earns $160 a day. If both of them work 8 hours a day, 5 days a week who earns a higher hourly wage? How much higher is it?

A. Brad; $6.25
B. Brandon; $6.25
C. Brad; $10.00
D. Brandon; $10.00

Answer: B. Brandon; $6.25
To find out who earns more and by how much, find out each person's hourly wage. Brandon earns $1,050 for $8 \times 5 = 40$ hours of work. So his hourly wage is $1,050/40 = $26.25. Brad earns $160 for 8 hours of work. So his hourly wage is $160/8 = $20. Therefore, Brandon earns $26.25 – $20.00 = $6.25 more an hour.

4. Matthew's dad is 5 times as old as him. If the difference of their ages is 28, how old is Matthew?

A. 4
B. 5
C. 6
D. 7

Answer: D. 7
Let Matthew's age be x. Then Matthew's dad is $5x$ years old. The difference of their ages is 28. Therefore $5x - x = 28$. Solving this equation we get, $4x = 28$; $x = 7$. So Matthew is 7 years old.

5. Dana and Megan have to fill 500 envelopes for a charity. At the end of the morning Dana has filled 3/20 of the envelopes and Megan has filled 1/4 of them. How many envelopes have they filled together?

A. 75
B. 125
C. 200
D. 50

Answer: C. 200
The fraction of envelopes Dana and Megan have filled together = 3/20 + 1/4. Expressing this sum in terms of the common denominator 20, 3/20 + 1/4 = 3/20 + 5/20 = 8/20 = 2/5. 2/5 of 500 = (2/5) $\times$ 500 = 200. So Dana and Megan have filled 200 envelopes together.

6. A school garden had been divided into 7/8 square meter plots for students. If the area of the garden is 210 square meters, how many students can get plots?

A. 240
B. 210
C. 184
D. 78

Answer: A. 240
Since the 210 square meter garden has been divided into plots of area 7/8 square meter each, the number of plots is 210 divided by 7/8. To divide by 7/8, flip the fraction to 8/7 and multiply. 210 $\times$ (8/7) = 240. So there are 240 plots.

7. 300 school children went on a field trip. 30% of them were first graders, 45% second graders, and the rest were third graders. How many more first graders were there than third graders?

A. 5
B. 15
C. 30
D. 45

Answer: B. 15
Since 45% + 30% = 75%, 75% of the children were first and second graders. The percentage of third graders = 100% – 75% = 25%. The number of third graders = (25/100) × 300 = 75. The number of first graders = (30/100) × 300 = 90. So there were 90 – 75 = 15 more first graders than third graders.

8. A dress that costs $155.00 is on sale with a discount of 25%. What is the sale price of the dress?

A. $38.75
B. $116.25
C. $130.00
D. $122.50

Answer: B. $116.25
The discount amount is 25% of $155 = (25/100) × $155 = $38.75. So the sale price of the dress = $155 – $38.75 = $116.25.

9. Marlo pays $750 rent each month. Bea's rent is 12% higher. What is the ratio of Marlo's rent to Bea's rent?

A. 5:6
B. 15:16
C. 25:28
D. 25:26

Answer: C. 25:28
First find Bea's rent. 12% of $750 = (12/100) × 750 = $90. So Bea's rent = $750 + $90 = $840. The ratio of Marlo's rent to Bea's rent is 750:840. Dividing by the common factor 30, 750:840 = 25:28.

10. A cake recipe calls for 5 cups of flour to bake 2 cakes. How many cups of flour will be needed to bake 7 cakes?

A. 35
B. 24.5
C. 17.5
D. 12

Answer: C. 17.5
Set up the proportion 5/2 = *x*/7. To solve for *x*, multiply both sides of the equation by 14 to get 35 = 2*x*. So *x* = 17.5.

11. The scale of the model of a car is 1:24. If the full-size car is 12 ft long, how long is the model?

A. 4 inches
B. 5 inches
C. 6 inches
D. 7 inches

Answer: C. 6 inches
Set up the proportion 1/24 = *x*/12. To solve for *x*, multiply both sides of the equation by 24 to get 1 = 2*x*. So *x* = 1/2 ft = 6 inches.

12. On the throw of a six-sided die, what is the probability that you will roll a number less than 3?

A. 1/2
B. 1/6
C. 1/3
D. 2/3

Answer: C. 1/3
To find the probability, divide the number of acceptable outcomes by the total number of possible outcomes. The acceptable outcomes are 1 and 2, so there are 2 of them. The total number of possible outcomes is 6. So the probability of rolling a number less than 3 is 2/6 which reduces to 1/3.

13. A bag contains 6 black marbles and 4 white marbles. Sally takes out a black marble and does not put it back. What is the probability that the next marble she picks will also be black?

A. 6/10
B. 9/25
C. 1/2
D. 5/9

Answer: D. 5/9
Since Sally has taken out a black marble, the bag now contains 5 black marbles and 4 white marbles. So the probability of the next marble being black is 5/9.

14. Mangoes are sold at $8.40 a dozen. How much will 15 mangoes cost?

A. $12.60
B. $11.50
C. $10.70
D. $10.50

Answer: D. $10.50
The cost of one mango = $8.40/12 = $0.70. The cost of 15 mangoes = $0.70 $\times$ 15 = $10.50.

15. Rosita buys 300 feet of yarn for a craft project. If the yarn costs 12 cents a yard, how much does Rosita spend?

A. $36.00
B. $1,200.00
C. $360.00
D. $12.00

Answer: D. $12.00
Since the cost of the yarn is given in yards, first convert the length of yarn Rosita bought into yards. Since 3 feet = 1 yard, 300 feet = 300/3 = 100 yards. Rosita spent 100 $\times$ 12 cents = 1200 cents = $12.00.

16. Mrs. Lafferty's 5 children are 6, 8, 14, 15, and 17 years old. What is their average age?

A. 14
B. 13
C. 12
D. 11

Answer: C. 12
To find the average age, add the ages of all the children and divide by the number of children. The sum of the ages of the children = 6 + 8 + 14 + 15 + 17 = 60. So their average age = 60/5 = 12.

Mathematics Knowledge

1. $\frac{10!}{7!}$ **is equal to:**

A. 6
B. 61
C. 120
D. 720

Answer: D. 720
10! is 10 factorial, which is defined as $10! = 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$.
7! is 7 factorial, which is defined as $7! = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$.
When 10! is divided by 7!, the common terms 7, 6, 5, 4, 3, 2, and 1 in the numerator and denominator get cancelled. So $\frac{10!}{7!} = 10 \times 9 \times 8 = 720$.

2. $\frac{6^4}{6^3 x 6^2}$ **= ?**

A. 6
B. 6^9
C. 6^{-1}
D. 6^5

Answer: C. 6^{-1}
These are rules for multiplying and dividing terms with exponents:
$a^m \times a^n = a^{m+n}$; $\frac{a^m}{a^n} = a^{m-n}$.
So $\frac{6^4}{6^3 x 6^2} = \frac{6^4}{6^{3+2}} = \frac{6^4}{6^5} = 6^{4-5} = 6^{-1}$.

3. $\sqrt[3]{64}$ **= ?**

A. 9
B. 4
C. 6
D. 8

Answer: B. 4
$4 \times 4 \times 4 = 64$. Therefore, $\sqrt[3]{64} = 4$.

4. $2(5-\sqrt{16})\div(14-12)\times 3=?$

A. 3
B. 20
C. 32
D. –4

Answer: A. 3
First perform the operation inside parentheses. This gives
$2(5-\sqrt{16})\div(14-12)\times 3=2(5-4)\div(14-12)\times 3=2(1)\div 2\times 3=2\div 2\times 3$.
Now do the multiplications and divisions from left to right:
$2\div 2\times 3=1\times 3=3$.

5. Solve for *a*: 7*a* + 2 = 3*a* – 5 + 2*a*

A. –2
B. 2
C. $-3\frac{1}{2}$
D. $3\frac{1}{4}$

Answer: C. $-3\frac{1}{2}$
First subtract 7*a* from both sides to get all the a terms on one side. Then 2 = 3*a* – 5 + 2*a* – 7*a*. Combine all the a terms: 2 = –2*a* – 5. Add 5 to both sides to get 7 = –2*a*. Dividing both sides by –2, *a* = –7/2 = $-3\frac{1}{2}$.

6. Solve for *x*: 5(2*x* –1) = 3(4*x* +3)

A. $\frac{1}{6}$
B. –7
C. 2
D. –3

Answer: B. –7
First use the distributive law on both sides to write the equation as 10*x* – 5 = 12*x* + 9. Subtract 12*x* from both sides: –2*x* – 5 = 9. Add 5 to both sides: –2*x* = 14. Divide both sides by –2: *x* = –7.

7. Evaluate the expression $(x+y)^3-5x+7y$, if *x* = 0 and *y* = 3.

A. 48
B. 102
C. 84
D. –8

Answer: A. 48
First substitute the variable values in the expression. Then use order of operations to evaluate the expression.
$(x+y)^3-5x+7y=(0+3)^3-5(0)+7(3)=3^3+21=27+21=48$.

8. Solve: $3+6x\le 3x-3$

A. $x\ge -2$
B. $x\le -2$
C. $x\le 0$
D. $x\ge 1$

Answer: B. $x\le -2$
Subtract 3*x* from both sides and combine the *x* terms: $3+6x-3x\le -3;\ \ 3+3x\le -3$.
Subtract 3 from both sides: $3x\le -3-3;\ 3x\le -6$. Divide both sides by 3: $x\le -2$.

9. What is the name of a quadrilateral with four equal sides?

A. Trapezoid
B. Parallelogram
C. Rhombus
D. Pentagon

Answer: C. Rhombus
A quadrilateral with four equal sides is called a rhombus. A square is a special kind of rhombus with all right angles.

10. A 55° angle is:

A. A right angle
B. An acute angle
C. An obtuse angle
D. An exterior angle

Answer: B. An acute angle
Angles smaller than 90 degrees are called acute angles.

11. An isosceles triangle:

A. Has no equal sides
B. Has two equal angles
C. Has no acute angles
D. Has two obtuse angles

Answer: B. Has two equal angles
An isosceles triangle, by definition, has two equal sides and two equal angles.

12. The side of an equilateral triangle is 20 cm. Its perimeter is:

A. 20 cm
B. 40 cm
C. 60 cm
D. 80 cm

Answer: C. 60 cm
Since all three sides of an equilateral triangle are equal, its perimeter is three times its side. So the perimeter of the triangle = $20 \times 3 = 60$ cm.

13. The area of a rectangle is 144 in^2. If the length of the rectangle is 16 in., what is its width?

A. 3 in.
B. 5 in.
C. 9 in.
D. 12 in.

Answer: C. 9 in.
The area of a rectangle = length $\times$ width. So the width of a rectangle = area / length. The width of the given rectangle = 144 in^2 / 16 in = 9 in.

14. The circumference of a circle is equal to 10π cm. Its radius is:

A. 10 cm
B. 7.5 cm
C. 5 cm
D. 10π cm

Answer: C. 5 cm
The circumference of the circle = π × diameter = 10π cm, so the diameter of the circle = 10 cm. Therefore the radius = diameter/2 = 5 cm.

15. How much will it cost to paint a circular patio of radius 7 m if the cost of the paint per square meter is $2.00?

A. $308.00
B. $154.00
C. $77.00
D. $616.00

Answer: A. $308.00
The area of the patio = $\pi r^2 = \pi(7^2) = 49\pi = 154$ sq. m. Therefore the cost of painting the patio = 154 × 2 = $308.00.

16. A rectangular box has a length of 7 ft, a width of 3 ft, and a height of 2 ft. What is its volume?

A. 67 ft^3
B. 42 ft^3
C. 42 ft^2
D. 24 ft^3

Answer: B. 42 ft^3
The volume of the rectangular box = length × width × height = 7 × 3 × 2 = 42 ft^3. Note that choice C also has the right number but the wrong unit.