MOCK UPCAT 2: ANSWER KEY WITH SOLUTIONS

1. **A**

$\frac{5}{8}\ of\ \frac{32}{115}\ of\ \frac{161}{200} = \left(\frac{5}{8}\right)\left(\frac{32}{115}\right)\left(\frac{161}{200}\right)$

$= \left(\frac{5}{\cancel{8}}\right)\left(\frac{\cancel{32}^{4}}{115}\right)\left(\frac{161}{200}\right) = \left(\frac{\cancel{5}}{1}\right)\left(\frac{4}{\cancel{115}^{23}}\right)\left(\frac{161}{200}\right)$

$= \left(\frac{1}{1}\right)\left(\frac{4}{\cancel{23}}\right)\left(\frac{\cancel{161}^{7}}{200}\right) = \left(\frac{1}{1}\right)\left(\frac{4}{1}\right)\left(\frac{7}{\cancel{200}^{50}}\right)$

$= \mathbf{\frac{7}{50}}$

2. **C**

$0.\overline{84} = \frac{84}{99} = \frac{\cancel{84}^{28}}{\cancel{99}^{33}} = \mathbf{\frac{28}{33}}$

3. **D**

$=11\frac{5}{21} - 21\frac{4}{51} = -\left(21\frac{4}{51} - 11\frac{5}{21}\right)$

$= -\left(20\frac{55}{51} - 11\frac{5}{21}\right) = -[(20-11) + \left(\frac{55}{51} - \frac{5}{21}\right)]$

$= -\left[9 + \left(\frac{55\cdot 7 - 5\cdot 17}{357}\right)\right] = -[9 + \left(\frac{385-85}{357}\right)]$

$= -\left(9\frac{300}{357}\right) = -9\left(\frac{100}{119}\right) = \mathbf{-9\frac{100}{119}}$

4. **A**

w: $\frac{5}{6}$ finished → $\frac{1}{6}$left

x: $\frac{7}{9}$ finished → $\frac{2}{9}$left

y: $\frac{13}{18}$ finished → $\frac{5}{18}$ left

z: $\frac{7}{12}$finished → $\frac{5}{12}$ left

$\frac{1}{6} > \frac{2}{9} > \frac{5}{18} > \frac{5}{12}$; **w, x, y, z**

5. **C**

Jake: $\frac{3}{8}$→ $\frac{5}{8}$ left

Sheila: $\left(\frac{1}{3}\right)\left(\frac{5}{8}\right) = \frac{5}{24}$

$\frac{5}{8} - \frac{5}{24} = \frac{5}{12}$ left

Henry: $\left(\frac{1}{2}\right)\left(\frac{5}{12}\right) = \frac{5}{24}$

$\mathbf{\frac{5}{24}}$ **left**

Note: Since Marian gave half or the remaining pie to Henry, she was left with the other half of the remaining pie. Thus, Marian has the same amount of pie as Henry does.

6. **C**

$0.52 = \frac{52}{100} = \frac{26}{50} = \mathbf{\frac{13}{25}}$

7. **C**

a. 0.00035

b. $\frac{.355}{100000} = 0.00000355$

c. $\frac{(35)(10^{-6})}{0.01} = \frac{(35)(10^{-6})}{10^{-2}} = (35)(10^{[-6-2]})$

$= \mathbf{(35)(10^{-4}) = 0.0035}$

d. $3550(10^{-8}) = 0.00003550$

8. **C**

a. 1/.3 = 10/3 = 3.33

b. .3/3 = 0.1

c. $\mathbf{(.3)^2 = 0.09}$

d. d. .3 - .003 = 0.297

9. **B**

15mm – 6mm = 9mm removed

$\frac{9\ mm}{0.006\ mm/sheet}$ = **1500 sheets**

10. **B**

$\frac{3}{5}$ x = 15 mins;

x = $\frac{15\ mins.}{3/5} = (15\ mins.)\left(\frac{5}{3}\right)$ = **25 mins.**

11. **D**

(30m)(20m) = 600 m^2

(600 m^2) $\left(\frac{P720}{50\ m^2}\right)$ = **P8640**

12. **D**

3:5 :: x:35;

5x = (35)(3) = 105

x = $\frac{105}{5}$ = **21**

13. **D**

Given only the cost of a compact disc player, you cannot determine the percent discount placed on it.

14. **B**

$\%\ Alcohol = \frac{Amount\ of\ Alcohol}{Total\ Amount\ of\ liquids}$

$= \frac{(150mL\cdot 0.2)+50mL}{150mL+50mL(alcohol)+50mL(water)}$

$= \frac{30mL+50mL}{250mL} = \frac{80mL}{250mL} = \mathbf{32\%}$

15. **C**

$(x)\left(\frac{7}{9}\right) = \frac{2}{3}$; $x = \frac{2/3}{7/9} = \frac{2}{\cancel{3}}\cdot\frac{\cancel{9}^{3}}{7} = \frac{6}{7} = \mathbf{85.71\%}$

16. **B**

$\frac{\left(\frac{5}{6}\right)^3}{\frac{25}{6^2}} = \frac{\frac{5^3}{6^3}}{\frac{5^2}{6^2}} = \left(\frac{5^3}{6^3}\right)\left(\frac{6^2}{5^2}\right) = \left(\frac{5^{\cancel{3}}}{6^3}\right)\left(\frac{6^2}{\cancel{5^2}}\right)$

$= \left(\frac{5}{6^{\cancel{3}}}\right)\left(\frac{\cancel{6^2}}{\cancel{1}}\right) = \mathbf{\frac{5}{6}}$

17. **B**

$(-\sqrt[3]{9^2})^6 = [(-1)(\sqrt[3]{9^2})]^6 = (-1)^6(\sqrt[3]{9^2})^6$

$= (1)(9^{\frac{2}{3}})^6 = 9^{\frac{12}{3}} = 9^4 = \mathbf{6561}$

18. **B**

$[(\sqrt{x})(\sqrt[4]{y})]^8 = [(x^{\frac{1}{2}})(y^{\frac{1}{4}})]^8 = [(x^{\frac{8}{2}})(y^{\frac{8}{4}})]$

$= \mathbf{x^4 y^2}$

19. **A**

$(6)(9)(N) = (-3)^4(-2)^3$

$N = \frac{(-3)^4(-2)^3}{(6)(9)} = \frac{\cancel{(81)}^{9}(-8)}{(6)\cancel{(9)}} = \frac{\cancel{(9)}^{3}(-8)}{\cancel{6}^{\,2}} = \frac{(3)(-\cancel{8})^{4}}{\cancel{2}}$

= (3)(-4) = **-12**

20. **A**

$(\sqrt{27r^3})(\sqrt{3r}) = \sqrt{(27r^3)(3r)} = \sqrt{81r^4} = \mathbf{9r^2}$

21. **A**

$3^y = z$

$3^{y+2} = (3^y)(3^2) = (3^y)(9) = (9)(3^y) = \mathbf{9z}$

22. **A**

0.104 – 2y = 0.02y – 0.3

0.104 + 0.3 = 0.02y + 2y

0.404 = 2.02y

y = 0.404/2.02 = **0.2**

23. **B**

(3)(4)(8)(32)(R) = (16)(32)(12)

$R = \frac{(16)(32)(12)}{(3)(4)(8)(32)} = \frac{(16)\cancel{(32)}(12)}{(3)(4)(8)\cancel{(32)}} = \frac{(16)\cancel{(12)}}{\cancel{(3)}\cancel{(4)}(8)} = \frac{\cancel{16}^{\,2}}{\cancel{8}} = \mathbf{2}$

24. **A**

$P = \frac{JK}{L^2}$

Let M be the new value for P after the variables J, K or L were changed

a. **If L is halved**

$\mathbf{M = \frac{JK}{(\frac{1}{2}L)^2} = \frac{JK}{\frac{1}{4}L^2} = 4\frac{JK}{L^2} = 4P}$

b. If L is doubled

$M = \frac{JK}{(2L)^2} = \frac{JK}{4L^2} = \frac{1}{4}P$

c. If J is doubled

$M = \frac{(2J)(K)}{L^2} = \frac{2JK}{L^2} = 2P$

d. If L is quadrupled

$M = \frac{JK}{(4L)^2} = \frac{JK}{16L^2} = \frac{1}{16}P$

25. **C**

Let x be Lou's age

3x – 6 be Lee's age

x + 5 be Lou's age after 5 years

3x – 6 + 5 = 3x-1 be Lee's age after 5 years

(2)(x + 5) = 3x – 1

2x + 10 = 3x – 1

11 = x or x = **11**

26. **C**

$\frac{P2800}{3\,parts+2\,parts+1\,part} = \frac{P2800}{6\,parts}$ = P466.67/part

2nd child will get 2 parts:

(2)(P466.67) = **P933.33**

27. **C**

Let A be Pedro's money

B be Juan's money (before giving Pedro)

C be Jose's money

B = 4C = (4)(P30) = P120

A = ½ B = (½)(P120) = P60

28. **A**

$-x^2 - 3x + 36 = 3x^2 - 3x + 108$

$4x^2 = 144$

$x^2 = 36$

$x = \sqrt{36} = \pm 6$

29. **C**

$\frac{10x+25p-3}{5xp+1} = 2$

10x + 25p – 3 = (2)(5xp + 1)

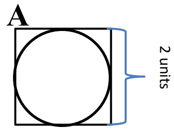
10x + 25p – 3 = 10xp + 2

10x – 10xp = 2 + 3 – 25p

(10x) (1-p) = 5 – 25p = (5)(1 – 5p)

$x = \frac{\cancel{5}(1-5p)}{{}_2\cancel{10}(1-p)} = \mathbf{\frac{1-5p}{2(1-p)}}$

30. **A**



diameter: 2 units

radius: (½)(diameter) = (½)(2) = 1 unit

Area: $\pi r^2 = \pi(1)^2 = \boldsymbol{\pi}$

31. **D**

(16 in)(30 in) = 480 in^2

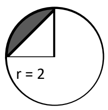
Squares with side 1: 1 in by 1 in

$Area_{square}$: (1 in)(1 in) = 1 in^2

$Area_{shaded} = Area_{rectangles} - \text{Total } Area_{squares}$

= 480 – (6)(1) = 480 – 6 = **474 in^2**

32. **A**



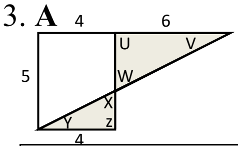
$A_{circle} = \pi r^2 = \pi(2)^2 = 4\pi$

$A_{quarter\text{-}circle} = (¼)(A_{circle}) = (¼)(4\pi) = \pi$

$A_{triangle} = ½\, b \cdot h = ½\,(2)(2) = ½\,(4) = 2$

$A_{shaded} = A_{quarter\text{-}circle} - A_{triangle} = \boldsymbol{\pi - 2}$

33. **A**



Statement	Reason
1. ∠W&∠X are vertical angles	1. Definition of Vertical Angles
2. m∠W = m∠X	2. Vertical Angle Theorem
3. ∠V and ∠Y are alternate interior angles	3. Definition of Alternate Interior Angles
4. m∠V = m∠Y	4. Alternate Interior Angle Theorem
5. ΔWUV is similar to ΔXZY	5. AA Similarity Postulate
6. The sides of ΔWUV are in proportion to ΔXZY	6. Definition of Similar Triangles

WU:UV::XZ:ZY

Note: WU + XZ = 5

Let x = WU

x + XZ = 5

XZ = 5–x

x:6 :: (5-x):4

(x)(4) = (6)(5–x)

4x = 30–6x

10x = 30

x = 3 = WU

5–x = 5–3 = 2 = XZ

$Area_{\,triangle} = \frac{1}{2}bh$

$Area_{\Delta WUV} = \left(\frac{1}{2}\right)(6)(3) = \frac{1}{2}18 = 9$

$Area_{\Delta XZY} = \left(\frac{1}{2}\right)(4)(2) = \left(\frac{1}{2}\right)8 = 4$

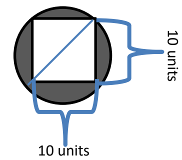
$Area_{shaded}$ = 9 + 4 = **13**

34. **D**

$Area_{shaded}$:$Area_{ABCD}$

13:(5)(4); **13: 20**

35. **B**



If the perimeter of the square is 40, then each side is 40/4 or 10 units long and its area is 100 square units. If you draw a diagonal inside the inscribed square, you can notice that this line is also the diameter of the circle. To compute for the length of this line, we can use the Pythagorean Theorem.

Length of Diagonal:

$x^2 + y^2 = z^2$

$10^2 + 10^2 = z^2$

$200 = z^2$

$z = 10\sqrt{2}$

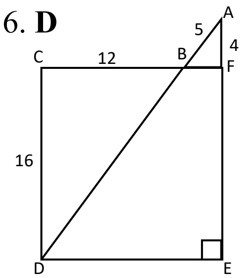
$diagonal/diameter = 10\sqrt{2}$

It follows that the radius of the circle is $\frac{10\sqrt{2}}{2}$ or $5\sqrt{2}$. Thus the area of the circle is:

$A = \pi r^2 = \pi(5\sqrt{2})^2 = 50\pi.$

$A_{shaded} = A_{circle} - A_{square} = \boldsymbol{50\pi - 100}$

36. **D**



Statement	Reason
1. DE || BF	1. A trapezoid has one pair of parallel sides
2. m∠FED=m∠AFB = 90°	2. Corresponding Angles Postulate
3. ΔFAB is a right triangle	3. Definition of a right triangle
4. BF = 3	4. Pythagorean Theorem (3-4-5 Pythagorean Triple)
5. CF = CB + BF	5. Segment Addition Postulate
6. CF= 12 + 3 = 15	6. Substitution of Values; Given
Since CDEF is a rectangle, then CF = DE.	

$\text{Area}_{\text{trapezoid}} = \frac{b_1+b_2}{2}h = \frac{3+15}{2}16 = \frac{18}{2}16$

$= (9)(16) =$ **144 sq. units**

37. **C**

Let x be the width of the rectangle

x+3 be the length of the rectangle

2 (x + 3) + 2 (x) = 34

2x + 6 + 2x = 34

4x + 6 = 34

4x = 34 – 6 = 28

$x = \frac{28}{4} = 7$

x + 3 = 10

Area = (length)(width) = (10)(7)

= **70 sq. units**

38. **A**

$A_{\text{smaller circle}} : A_{\text{bigger circle}}$

$\pi r_{small}{}^2 : \pi r_{big}{}^2$

$d_{small} = radius_{big}$

$2radius_{small} = radius_{big}$

$A_{small} : A_{big}$

$\pi(radius_{small})^2 : \pi(radius_{big})^2$

$\pi(radius_{small})^2 : \pi(2radius_{small})^2$

$\pi(radius_{small})^2 : \pi(4)(radius_{small})^2$

1: 4

39. **D**

$V_{cone} = \frac{1}{3}\pi r^2 h$

$245\pi\ cm^3 = \frac{1}{3}\pi r^2 (15\ cm)$

$735\pi\ cm^3 = \pi r^2 (15\ cm)$

$\mathbf{49\pi\ cm^2} = \pi r^2$ = Area of circular base

40. **B**

$SA_{cube} = 6s^2$

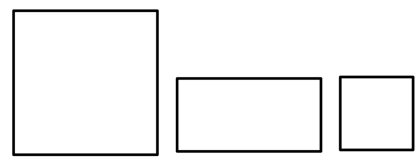
$216\ cm^2 = 6s^2$

$s^2 = 36cm^2$

$s = 6\ cm$

$V_{cube} = s^3 = (6\ cm)^3 = \mathbf{216cm^3}$

41. **D**



$Area_{rectangle} = (base)(height)$

$Area_{square\ paper} = (16cm)(16cm)$

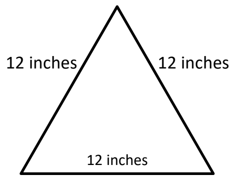
$Area_{after\ first\ fold} = (16\ cm)(8cm)$

$Area_{after\ second\ fold} = (8\ cm)(8\ cm)$

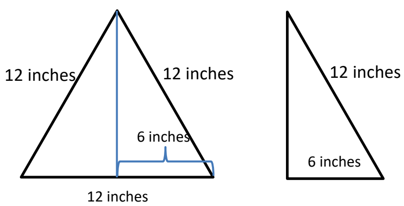
$= \mathbf{64\ cm^2}$

42. **C**

If the perimeter of an equilateral triangle is 36 inches, then each side measures 36/3 or 12 inches.



To measure the height, we can draw a perpendicular bisector in the triangle and consider the height as one of the sides of the half-triangle.



We can use the Pythagorean Theorem to look for the measurement of the height.

$a^2 + b^2 = c^2$

$(6\ inches)^2 + b^2 = (12\ inches)^2$

$36\ inches^2 + b^2 = 144\ inches^2$

$b^2 = 144\ inches^2 - 36\ inches^2$

$b^2 = 108\ inches^2$

$b = 6\sqrt{3} = height$

$A_{triangle} = \frac{1}{2}bh = \frac{1}{2}(12)(6\sqrt{3})$

$= (6)(6\sqrt{3}) = \mathbf{36\sqrt{3}}$

43. **B**

$SA_{cylinder} = 4\pi r^2$

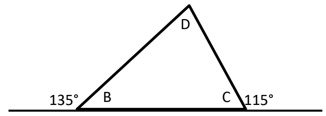
$256\pi mm^2 = 4\pi r^2$

$64\ mm^2 = r^2$

$r = \mathbf{8\ mm}$

Since the radius of the ball is 8 mm, the minimum radius of a cylinder for a ball to get through it is also 8 mm.

44. **C**



Let B and C be the other angles in the triangle.

Statement	Reason
1. 135° and ∠B forms a linear pair; 115° and ∠C forms a linear pair	1. Definition of a linear pair
2. 135° and ∠B are supplementary; 115° and ∠C are supplementary	2. Linear Pair Theorem
3. 135° + m∠B = 180°; 115° + m∠C = 180°	3. Definition of Supplementary angles
4. m∠B = 45°; m∠C = 65°	4. Subtraction Property of Equality
5. m∠B + m∠C + m∠D = 180°	5. Triangle angle sum theorem
6. 45° + 65° + m∠D = 180°	6. Addition Property of Equality
7. m∠D = **70°**	7. Subtraction Property of Equality

45. **B**

2:3:5 = (2x):(3x):(5x)

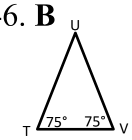
2x + 3x + 5x = 180°

10x = 180°

x = 18°

Largest Angle: 5x = **90°**

46. **B**



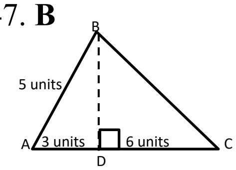
Given the first measures of two of the interior angles of the triangle, we can say that the measure of the third angle is 30°, since the sum of the measures of the three interior angles in any given triangle is 180°.

a. **TU = UV**; (TRUE; Converse of Isosceles Triangle Theorem: If two angles of a triangle are equal in measure, then the sides opposite those angles are equal in measure.)

b. **TV > UV**; (**FALSE**; If two angles of a triangle are not congruent, then the longer side is opposite the larger angle. Since 75° > 30°, then both TU and UV are greater than TV.)

c. **TU > TV** (TRUE; same explanation as in b)
d. **∠U = 30°** (TRUE; Triangle Angle Sum Theorem: the sum of the measures of the three interior angles in any given triangle is 180°.)

47. **B**

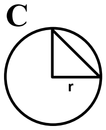


Since the dashed line is a perpendicular bisector, we can say that ΔABD is a right triangle. Thus, the height is 4 units (Pythagorean triple: 3-4-5).

The area of the triangle can then be computed by adding the areas of the two right triangles.

$A_{total} = \frac{(AD)(DB)}{2} + \frac{(DC)(DB)}{2} = \frac{(3)(4)}{2} + \frac{(6)(4)}{2}$
$= \frac{12}{2} + \frac{24}{2} = 6 + 12 =$ **18 sq. units**

48. **C**



If the area of the circle is 64π square units, then the radius of the circle is
$A = \pi r^2$
$64\pi = \pi r^2$
$64 = r^2$
$r = 8\,units$

Since the radius of the circle is also the base and height of the triangle, the area of the triangle is $\frac{(b)(h)}{2} = \frac{(r)(r)}{2} = \frac{(8)(8)}{2} = \frac{64}{2}$
= **32 sq. units**

49. **C**
Sum = (Average)(number of items)
Sum of weights = (57g)(3) = 171g

Since balls A and B are identical and the weight of ball A is 46g, then the weight of ball B is also 46g. Thus, the weight of ball C is 171g – [(46g)(2)] = 171g – 92g = **79g**.

50. **D**
Probability= $\frac{number\ of\ desired\ outcomes}{total\ number\ of\ possible\ outcomes}$
Desired outcome: Sum shown on dice is divisible by 5. (1 + 4; 4 + 1; 2 + 3; 3 + 2; 6 + 4; 4 + 6; and 5 + 5): seven favorable outcomes)
Possible outcomes: (6)(6) = 36(Six possible outcomes on each die.)

$Probability = \mathbf{\frac{7}{36}}$

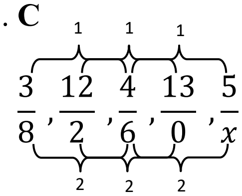
51. **C**
Let A be the group of Ilonggo-speaking students
B be the group of Visayan-speaking students

Since there are 3 students who speak neither Ilonggo nor Visayan, then the total number of students who can speak at least one language is A ∪ B = 15 – 3 = 12.

A + B – A ∪ B = A ∩ B
8 + 7 – 12 = A ∩ B
15 – 12 = 3 = A ∩ B (number of students who knows both dialects)
Probability = $\frac{students\ who\ knows\ both\ dialects}{total\ number\ of\ students}$
$= \frac{3}{15} = \mathbf{\frac{1}{5}}$

52. **B**
3 soft drinks + 2 juices = 5 drinks
\# of combinations = 2 sandwiches · 5 drinks
= **10 combinations**

53. **C**



6 – 2 = **4**

54. **C**

$|(-9)-(-6)| = |-3| = 3$

$S_n = \frac{(n)(a_1+a_n)}{2}$

$= \frac{(n)(-9+a_n)}{2}$

$= \frac{(n)\{-9+[a_1+(n-1)d\,]\}}{2}$

$= \frac{(n)\{-9+[-9+(n-1)3\,]\}}{2}$

$= \frac{(n)[-9+(-9+3n-3\,)]}{2}$

$= \frac{(n)[-9+(3n-12)]}{2}$

$= \frac{(n)(-9+3n-12)}{2}$

$= \frac{(n)(3n-21)}{2}$

$= \frac{3n^2-21n}{2} = 66$

$132 = 3n^2 - 21n$

$3n^2 - 21n - 132 = 0$

$n^2 - 7n - 44 = 0$

$(n-11)(n+4) = 0$

$n = \mathbf{11}, -4$

However, since the number of terms cannot be negative (there is no such thing as -4 terms in a sequence), then the number of terms in the sequence must be 11.

55. **B**

4x, 6y, ___

common ratio: $\frac{6y}{4x} = \frac{3y}{2x}$

next term: $\overset{3}{\cancel{6}}y\,(\frac{3y}{\cancel{2}x}) = \frac{9y^2}{x}$

56. **A**

$3x^2 - kx - 2 = 0$

$3x^2 - kx = 2$

$x\,(3x-k) = 2$

$3x - k = \frac{2}{x}$

$3x - \frac{2}{x} = k$

$\frac{3x^2-2}{x} = k$

57. **A**

R = $\frac{1}{\frac{1}{X}+\frac{1}{Y}}$

Since x = $\frac{1}{3}$ and y = 1, then R =

R = $\frac{1}{\frac{1}{1/3}+\frac{1}{1}} = \frac{1}{3+1} = \mathbf{\frac{1}{4}}$

58. **A**

a = 3b + 1

a – 1 = 3b

b = $\frac{a-1}{3}$

m = $\frac{1}{a}$ + b

m = $\frac{1}{a} + \frac{a-1}{3}$

m = $\frac{3}{3a} + \frac{a^2-a}{3a} = \frac{3+a^2-a}{3a} = \mathbf{\frac{a^2-a+3}{3a}}$

59. **B**

$\frac{x^{1/3}y^{-4}z^{12}}{x^5y^{1/2}z^{15}} = x^{(\frac{1}{3}-5)}y^{(-4-(1/2))}z^{12-15}$

$= x^{-14/3}y^{-9/2}z^{-3} = \mathbf{\frac{z^{-3}}{x^{14/3}y^{9/2}}}$

60. **A**

$(3a^{-1}b^{2/3}c^2)^3 = 27a^{-3}b^2c^6 = \frac{27b^2c^6}{a^3}$

$= \frac{(27)(8)^2(-1)^6}{(-2)^3} = \frac{(27)(64)(1)}{(-8)} = \frac{(27)\overset{8}{\cancel{(64)}}(1)}{\underset{-1}{\cancel{(-8)}}}$

= **-216**