

Ebook Code: RENZ0078



Number Strategies



Working On Number And Algebra

Ages 11-13 years



Sample

Where Am I?

Circle the number that best answers each of the following questions.

1. 10 is greater than above A. 48 is greater than above
B. 10 is more than above C. 10 is more than above
D. 10 is less than above E. 10 is less than above
F. 10 is less than above G. 10 is less than above

2. 10 is less than above A. 10 is less than above
B. 10 is less than above C. 10 is less than above
D. 10 is less than above E. 10 is less than above
F. 10 is less than above G. 10 is less than above

Scientific Formulas

Let's calculate some useful quantities using formulas that we can use in science.

For example, the mass of an object is given by the formula: $Mass = Density \times Volume$ or $Mass = Density \times Length \times Width \times Height$.

For example, if you have a box that is 10 cm long, 5 cm wide and 2 cm high, then the mass of the box is:

$Mass = 10 \times 5 \times 2 = 100$ grams

1. Calculate the mass of the box.

A. 100 grams B. 1000 grams C. 10000 grams D. 100000 grams

2. Calculate the mass of a box that is 15 cm long, 10 cm wide and 5 cm high.

A. 1500 grams B. 15000 grams C. 150000 grams D. 1500000 grams

3. Calculate the mass of a box that is 20 cm long, 15 cm wide and 10 cm high.

A. 3000 grams B. 30000 grams C. 300000 grams D. 3000000 grams

4. Calculate the mass of a box that is 25 cm long, 20 cm wide and 15 cm high.

A. 7500 grams B. 75000 grams C. 750000 grams D. 7500000 grams

5. Calculate the mass of a box that is 30 cm long, 25 cm wide and 20 cm high.

A. 15000 grams B. 150000 grams C. 1500000 grams D. 15000000 grams

6. Calculate the mass of a box that is 35 cm long, 30 cm wide and 25 cm high.

A. 26250 grams B. 262500 grams C. 2625000 grams D. 26250000 grams

7. Calculate the mass of a box that is 40 cm long, 35 cm wide and 30 cm high.

A. 49000 grams B. 490000 grams C. 4900000 grams D. 49000000 grams

8. Calculate the mass of a box that is 45 cm long, 40 cm wide and 35 cm high.

A. 67500 grams B. 675000 grams C. 6750000 grams D. 67500000 grams

9. Calculate the mass of a box that is 50 cm long, 45 cm wide and 40 cm high.

A. 90000 grams B. 900000 grams C. 9000000 grams D. 90000000 grams

10. Calculate the mass of a box that is 55 cm long, 50 cm wide and 45 cm high.

A. 123750 grams B. 1237500 grams C. 12375000 grams D. 123750000 grams

11. Calculate the mass of a box that is 60 cm long, 55 cm wide and 50 cm high.

A. 165000 grams B. 1650000 grams C. 16500000 grams D. 165000000 grams

12. Calculate the mass of a box that is 65 cm long, 60 cm wide and 55 cm high.

A. 215250 grams B. 2152500 grams C. 21525000 grams D. 215250000 grams

13. Calculate the mass of a box that is 70 cm long, 65 cm wide and 60 cm high.

A. 273000 grams B. 2730000 grams C. 27300000 grams D. 273000000 grams

14. Calculate the mass of a box that is 75 cm long, 70 cm wide and 65 cm high.

A. 348750 grams B. 3487500 grams C. 34875000 grams D. 348750000 grams

15. Calculate the mass of a box that is 80 cm long, 75 cm wide and 70 cm high.

A. 420000 grams B. 4200000 grams C. 42000000 grams D. 420000000 grams

16. Calculate the mass of a box that is 85 cm long, 80 cm wide and 75 cm high.

A. 507500 grams B. 5075000 grams C. 50750000 grams D. 507500000 grams

17. Calculate the mass of a box that is 90 cm long, 85 cm wide and 80 cm high.

A. 603000 grams B. 6030000 grams C. 60300000 grams D. 603000000 grams

18. Calculate the mass of a box that is 95 cm long, 90 cm wide and 85 cm high.

A. 716250 grams B. 7162500 grams C. 71625000 grams D. 716250000 grams

19. Calculate the mass of a box that is 100 cm long, 95 cm wide and 90 cm high.

A. 840000 grams B. 8400000 grams C. 84000000 grams D. 840000000 grams

20. Calculate the mass of a box that is 105 cm long, 100 cm wide and 95 cm high.

A. 976500 grams B. 9765000 grams C. 97650000 grams D. 976500000 grams

21. Calculate the mass of a box that is 110 cm long, 105 cm wide and 100 cm high.

A. 1122000 grams B. 11220000 grams C. 112200000 grams D. 1122000000 grams

22. Calculate the mass of a box that is 115 cm long, 110 cm wide and 105 cm high.

A. 1278750 grams B. 12787500 grams C. 127875000 grams D. 1278750000 grams

23. Calculate the mass of a box that is 120 cm long, 115 cm wide and 110 cm high.

A. 1446000 grams B. 14460000 grams C. 144600000 grams D. 1446000000 grams

24. Calculate the mass of a box that is 125 cm long, 120 cm wide and 115 cm high.

A. 1623750 grams B. 16237500 grams C. 162375000 grams D. 1623750000 grams

25. Calculate the mass of a box that is 130 cm long, 125 cm wide and 120 cm high.

A. 1812000 grams B. 18120000 grams C. 181200000 grams D. 1812000000 grams

26. Calculate the mass of a box that is 135 cm long, 130 cm wide and 125 cm high.

A. 2011500 grams B. 20115000 grams C. 201150000 grams D. 2011500000 grams

27. Calculate the mass of a box that is 140 cm long, 135 cm wide and 130 cm high.

A. 2222000 grams B. 22220000 grams C. 222200000 grams D. 2222000000 grams

28. Calculate the mass of a box that is 145 cm long, 140 cm wide and 135 cm high.

A. 2443500 grams B. 24435000 grams C. 244350000 grams D. 2443500000 grams

29. Calculate the mass of a box that is 150 cm long, 145 cm wide and 140 cm high.

A. 2676000 grams B. 26760000 grams C. 267600000 grams D. 2676000000 grams

30. Calculate the mass of a box that is 155 cm long, 150 cm wide and 145 cm high.

A. 2919750 grams B. 29197500 grams C. 291975000 grams D. 2919750000 grams

31. Calculate the mass of a box that is 160 cm long, 155 cm wide and 150 cm high.

A. 3175000 grams B. 31750000 grams C. 317500000 grams D. 3175000000 grams

32. Calculate the mass of a box that is 165 cm long, 160 cm wide and 155 cm high.

A. 3441750 grams B. 34417500 grams C. 344175000 grams D. 3441750000 grams

33. Calculate the mass of a box that is 170 cm long, 165 cm wide and 160 cm high.

A. 3720000 grams B. 37200000 grams C. 372000000 grams D. 3720000000 grams

34. Calculate the mass of a box that is 175 cm long, 170 cm wide and 165 cm high.

A. 4010250 grams B. 40102500 grams C. 401025000 grams D. 4010250000 grams

35. Calculate the mass of a box that is 180 cm long, 175 cm wide and 170 cm high.

A. 4312500 grams B. 43125000 grams C. 431250000 grams D. 4312500000 grams

36. Calculate the mass of a box that is 185 cm long, 180 cm wide and 175 cm high.

A. 4626750 grams B. 46267500 grams C. 462675000 grams D. 4626750000 grams

37. Calculate the mass of a box that is 190 cm long, 185 cm wide and 180 cm high.

A. 4953000 grams B. 49530000 grams C. 495300000 grams D. 4953000000 grams

38. Calculate the mass of a box that is 195 cm long, 190 cm wide and 185 cm high.

A. 5291250 grams B. 52912500 grams C. 529125000 grams D. 5291250000 grams

39. Calculate the mass of a box that is 200 cm long, 195 cm wide and 190 cm high.

A. 5641500 grams B. 56415000 grams C. 564150000 grams D. 5641500000 grams

40. Calculate the mass of a box that is 205 cm long, 200 cm wide and 195 cm high.

A. 6003750 grams B. 60037500 grams C. 600375000 grams D. 6003750000 grams

41. Calculate the mass of a box that is 210 cm long, 205 cm wide and 200 cm high.

A. 6378000 grams B. 63780000 grams C. 637800000 grams D. 6378000000 grams

42. Calculate the mass of a box that is 215 cm long, 210 cm wide and 205 cm high.

A. 6764250 grams B. 67642500 grams C. 676425000 grams D. 6764250000 grams

43. Calculate the mass of a box that is 220 cm long, 215 cm wide and 210 cm high.

A. 7162500 grams B. 71625000 grams C. 716250000 grams D. 7162500000 grams

44. Calculate the mass of a box that is 225 cm long, 220 cm wide and 215 cm high.

A. 7572750 grams B. 75727500 grams C. 757275000 grams D. 7572750000 grams

45. Calculate the mass of a box that is 230 cm long, 225 cm wide and 220 cm high.

A. 8005000 grams B. 80050000 grams C. 800500000 grams D. 8005000000 grams

46. Calculate the mass of a box that is 235 cm long, 230 cm wide and 225 cm high.

A. 8459250 grams B. 84592500 grams C. 845925000 grams D. 8459250000 grams

47. Calculate the mass of a box that is 240 cm long, 235 cm wide and 230 cm high.

A. 8935500 grams B. 89355000 grams C. 893550000 grams D. 8935500000 grams

48. Calculate the mass of a box that is 245 cm long, 240 cm wide and 235 cm high.

A. 9423750 grams B. 94237500 grams C. 942375000 grams D. 9423750000 grams

49. Calculate the mass of a box that is 250 cm long, 245 cm wide and 240 cm high.

A. 9924000 grams B. 99240000 grams C. 992400000 grams D. 9924000000 grams

50. Calculate the mass of a box that is 255 cm long, 250 cm wide and 245 cm high.

A. 10436250 grams B. 104362500 grams C. 1043625000 grams D. 10436250000 grams

51. Calculate the mass of a box that is 260 cm long, 255 cm wide and 250 cm high.

A. 10960500 grams B. 109605000 grams C. 1096050000 grams D. 10960500000 grams

52. Calculate the mass of a box that is 265 cm long, 260 cm wide and 255 cm high.

A. 11496750 grams B. 114967500 grams C. 1149675000 grams D. 11496750000 grams

53. Calculate the mass of a box that is 270 cm long, 265 cm wide and 260 cm high.

A. 12045000 grams B. 120450000 grams C. 1204500000 grams D. 12045000000 grams

54. Calculate the mass of a box that is 275 cm long, 270 cm wide and 265 cm high.

A. 12605250 grams B. 126052500 grams C. 1260525000 grams D. 12605250000 grams

55. Calculate the mass of a box that is 280 cm long, 275 cm wide and 270 cm high.

A. 13177500 grams B. 131775000 grams C. 1317750000 grams D. 13177500000 grams

56. Calculate the mass of a box that is 285 cm long, 280 cm wide and 275 cm high.

A. 13761750 grams B. 137617500 grams C. 1376175000 grams D. 13761750000 grams

57. Calculate the mass of a box that is 290 cm long, 285 cm wide and 280 cm high.

A. 14358000 grams B. 143580000 grams C. 1435800000 grams D. 14358000000 grams

58. Calculate the mass of a box that is 295 cm long, 290 cm wide and 285 cm high.

A. 14966250 grams B. 149662500 grams C. 1496625000 grams D. 14966250000 grams

59. Calculate the mass of a box that is 300 cm long, 295 cm wide and 290 cm high.

A. 15586500 grams B. 155865000 grams C. 1558650000 grams D. 15586500000 grams

60. Calculate the mass of a box that is 305 cm long, 300 cm wide and 295 cm high.

A. 16218750 grams B. 162187500 grams C. 1621875000 grams D. 16218750000 grams

61. Calculate the mass of a box that is 310 cm long, 305 cm wide and 300 cm high.

A. 16863000 grams B. 168630000 grams C. 1686300000 grams D. 16863000000 grams

62. Calculate the mass of a box that is 315 cm long, 310 cm wide and 305 cm high.

A. 17519250 grams B. 175192500 grams C. 1751925000 grams D. 17519250000 grams

63. Calculate the mass of a box that is 320 cm long, 315 cm wide and 310 cm high.

A. 18187500 grams B. 181875000 grams C. 1818750000 grams D. 18187500000 grams

64. Calculate the mass of a box that is 325 cm long, 320 cm wide and 315 cm high.

A. 18867750 grams B. 188677500 grams C. 1886775000 grams D. 18867750000 grams

65. Calculate the mass of a box that is 330 cm long, 325 cm wide and 320 cm high.

A. 19559000 grams B. 195590000 grams C. 1955900000 grams D. 19559000000 grams

66. Calculate the mass of a box that is 335 cm long, 330 cm wide and 325 cm high.

A. 20261250 grams B. 202612500 grams C. 2026125000 grams D. 20261250000 grams

67. Calculate the mass of a box that is 340 cm long, 335 cm wide and 330 cm high.

A. 20975500 grams B. 209755000 grams C. 2097550000 grams D. 20975500000 grams

68. Calculate the mass of a box that is 345 cm long, 340 cm wide and 335 cm high.

A. 21701750 grams B. 217017500 grams C. 2170175000 grams D. 21701750000 grams

69. Calculate the mass of a box that is 350 cm long, 345 cm wide and 340 cm high.

A. 22439000 grams B. 224390000 grams C. 2243900000 grams D. 22439000000 grams

70. Calculate the mass of a box that is 355 cm long, 350 cm wide and 345 cm high.

A. 23187250 grams B. 231872500 grams C. 2318725000 grams D. 23187250000 grams

71. Calculate the mass of a box that is 360 cm long, 355 cm wide and 350 cm high.

A. 23946500 grams B. 239465000 grams C. 2394650000 grams D. 23946500000 grams

72. Calculate the mass of a box that is 365 cm long, 360 cm wide and 355 cm high.

A. 24716750 grams B. 247167500 grams C. 2471675000 grams D. 24716750000 grams

73. Calculate the mass of a box that is 370 cm long, 365 cm wide and 360 cm high.

A. 25498000 grams B. 254980000 grams C. 2549800000 grams D. 25498000000 grams

74. Calculate the mass of a box that is 375 cm long, 370 cm wide and 365 cm high.

A. 26290250 grams B. 262902500 grams C. 2629025000 grams D. 26290250000 grams

75. Calculate the mass of a box that is 380 cm long, 375 cm wide and 370 cm high.

A. 27093500 grams B. 270935000 grams C. 2709350000 grams D. 27093500000 grams

76. Calculate the mass of a box that is 385 cm long, 380 cm wide and 375 cm high.

A. 27907750 grams B. 279077500 grams C. 2790775000 grams D. 27907750000 grams

77. Calculate the mass of a box that is 390 cm long, 385 cm wide and 380 cm high.

A. 28733000 grams B. 287330000 grams C. 2873300000 grams D. 28733000000 grams

78. Calculate the mass of a box that is 395 cm long, 390 cm wide and 385 cm high.

A. 29569250 grams B. 295692500 grams C. 2956925000 grams D. 29569250000 grams

79. Calculate the mass of a box that is 400 cm long, 395 cm wide and 390 cm high.

A. 30416500 grams B. 304165000 grams C. 3041650000 grams D. 30416500000 grams

80. Calculate the mass of a box that is 405 cm long, 400 cm wide and 395 cm high.

A. 31274750 grams B. 312747500 grams C. 3127475000 grams D. 31274750000 grams

81. Calculate the mass of a box that is 410 cm long, 405 cm wide and 400 cm high.

A. 32144000 grams B. 321440000 grams C. 3214400000 grams D. 32144000000 grams

82. Calculate the mass of a box that is 415 cm long, 410 cm wide and 405 cm high.

A. 33024250 grams B. 330242500 grams C. 3302425000 grams D. 33024250000 grams

83. Calculate the mass of a box that is 420 cm long, 415 cm wide and 410 cm high.

A. 33915500 grams B. 339155000 grams C. 3391550000 grams D. 33915500000 grams

84. Calculate the mass of a box that is 425 cm long, 420 cm wide and 415 cm high.

A. 34817750 grams B. 348177500 grams C. 3481775000 grams D. 34817750000 grams

85. Calculate the mass of a box that is 430 cm long, 425 cm wide and 420 cm high.

A. 35731000 grams B. 357310000 grams C. 3573100000 grams D. 35731000000 grams

86. Calculate the mass of a box that is 435 cm long, 430 cm wide and 425 cm high.

A. 36655250 grams B. 366552500 grams C. 3665525000 grams D. 36655250000 grams

87. Calculate the mass of a box that is 440 cm long, 435 cm wide and 430 cm high.

A. 37590500 grams B. 375905000 grams C. 3759050000 grams D. 37590500000 grams

88. Calculate the mass of a box that is 445 cm long, 440 cm wide and 435 cm high.

A. 38536750 grams B. 385367500 grams C. 3853675000 grams D. 38536750000 grams

89. Calculate the mass of a box that is 450 cm long, 445 cm wide and 440 cm high.

A. 39494000 grams B. 394940000 grams C. 3949400000 grams D. 39494000000 grams

90. Calculate the mass of a box that is 455 cm long, 450 cm wide and 445 cm high.

A. 40462250 grams B. 404622500 grams C. 4046225000 grams D. 40462250000 grams

91. Calculate the mass of a box that is 460 cm long, 455 cm wide and 450 cm high.

A. 41441500 grams B. 414415000 grams C. 4144150000 grams D. 41441500000 grams

92. Calculate the mass of a box that is 465 cm long, 460 cm wide and 455 cm high.

A. 42431750 grams B. 424317500 grams C. 4243175000 grams D. 42431750000 grams

93. Calculate the mass of a box that is 470 cm long, 465 cm wide and 460 cm high.

A. 43433000 grams B. 434330000 grams C. 4343300000 grams D. 43433000000 grams

94. Calculate the mass of a box that is 475 cm long, 470 cm wide and 465 cm high.

A. 44445250 grams B. 444452500 grams C. 4444525000 grams D. 44445250000 grams

95. Calculate the mass of a box that is 480 cm long, 475 cm wide and 470 cm high.

A. 45468500 grams B. 454685000 grams C. 4546850000 grams D. 45468500000 grams

96. Calculate the mass of a box that is 485 cm long, 480 cm wide and 475 cm high.

A. 46502750 grams B. 465027500 grams C. 4650275000 grams D. 46502750000 grams

97. Calculate the mass of a box that is 490 cm long, 485 cm wide and 480 cm high.

A. 47548000 grams B. 475480000 grams C. 4754800000 grams D. 47548000000 grams

98. Calculate the mass of a box that is 495 cm long, 490 cm wide and 485 cm high.

A. 48604250 grams B. 486042500 grams C. 4860425000 grams D. 48604250000 grams

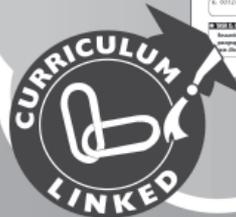
99. Calculate the mass of a box that is 500 cm long, 495 cm wide and 490 cm high.

A. 49671500 grams B. 496715000 grams C. 4967150000 grams D. 49671500000 grams

100. Calculate the mass of a box that is 505 cm long, 500 cm wide and 495 cm high.

A. 50750750 grams B. 507507500 grams C. 5075075000 grams D. 50750750000 grams

By Mirella Trimboli



Contents

Teacher Notes	4	Scientific Formulas	30
Curriculum Links	5	Create Your Own Formula	31
		Catching a Taxi Part 1	32
		Catching a Taxi Part 2	33
Integers		Electrician and the Plumber Part 1	34
Teachers' Notes	6	Electrician and the Plumber Part 2	35
Imagining Negative Numbers Part 1	7		
Imagining Negative Numbers Part 2	8		
Where Am I?	9	Fractions, Decimals and Percentages	
Integer Addition	10	Teachers' Notes	36
Integer Subtraction	11	Equivalent Fractions	37
Walking Up and Down the Number Line	12	Adding and Subtracting Fractions	38
Which is Larger?	13	Multiplying and Dividing Fractions	39
Multiplication of Signed Numbers	14	Ratios are Fractions	40
Multiply and Divide	15	Fractions and Percentages	41
		Decimals and Percentages	42
Indices, Squares and Square Roots		Fractions and Decimals	43
Teachers' Notes	16	What is my Test Score as a Percentage?	44
Using Index Numbers	17	What's the Discount?	45
Place Value Revisited	18	Best Buy	46
Expressions With Indices	19		
Prime Factor Trees	20	Linear Equations	
Easy Calculations Using Prime Factors	21	Teachers' Notes	47
A Different Approach to the		Equations Versus Expressions	48
Lowest Common Multiple	22	One-Step Equations	49
A Different Approach to the		Backtracking	50
Highest Common Factor	23	Two Step Equations	51
Square Numbers	24	Checking Solutions	52
Square Root	25	Solving Real Life Problems 1	53
		Solving Real Life Problems 2	54
Calculations and Algebraic			
Generalisations		Answers	55 - 58
Teachers' Notes	26		
How We Calculate	27		
Get the Order Right	28		
Calculations With Formulas	29		

Integers

Imagining Negative Numbers

This activity exposes students to the real life uses of negative numbers in two contexts. Students can further extend their understanding by a study of international temperatures, as given in Task C.

Where Am I?

In this activity students have the opportunity to familiarise themselves with the concept of a number line. Students should be able to fluidly explain the position of certain numbers relative to other numbers on the number line. Students can consolidate their understanding with Task C, and can make a game of it.

Integer Addition

This activity teaches students a method for adding directed numbers. For example, $-3 + 7$ means to start at -3 on the number line, turn towards the positive direction and move 7 spaces up the number line to 4. As another example, $4 - (-3)$ means to start at 4, turn towards the negative direction and then turn again (the second negative reverses the direction) and move 3 spaces up the number line to 7. Task C is an extension activity that students may like to explore using their calculators.

Integer Subtraction

Similar to the previous activity, students use the strategy of moving up and down the number line to subtract directed numbers. For example, $-5 - 7$ means starting at -5 , turning towards the negative direction and moving 7 spaces down the number line to -12 . Task C is an opportunity for students to test their skills with one of the numerous free maths games available on the internet.

Walking Up and Down the Number Line

This is a page of mental maths questions for students to practise their grasp of the addition and subtraction of directed numbers. Students are to be encouraged to attempt this task without using a number line, to help them develop their mental visualisation.

Which is Larger?

This activity allows students to practise their understanding of ordering and analyzing directed numbers. Students are also encouraged to use the correct inequality symbols. Task C provides students with another internet resource to practise their skills.

Multiplication of Signed Numbers

This activity is an investigative task for students to explore the rules behind multiplying and dividing directed numbers. Task B allows students to summarise their findings and develop a set of rules. Task C is an important task for students to explore to ensure they understand that the same rules apply for division as for multiplication.

Multiply and Divide

This is another mental maths task for students to test their skills with multiplication and division. This task can be used as an assessment task to test the progress achieved by students to date.

★ TASK A

The hilly town of Siena in Tuscany has a special sort of multi-level shopping centre. Look at the store directory sign right and study it carefully before answering the following questions.

a. What number could you use to represent the level that the Butcher and Bakery are on?

b. What do the negative level numbers represent?

c. If you park in Car Park A and travel on the lift to the Medical Centre, how many floors will you pass?

d. You leave the Post Office and travel 4 levels down on the lift. Do you arrive at the Laundromat?

e. If you leave the Laundromat and travel up the lift 5 floors, where do you end up?

f. Maria parks in Car Park A, travels up 4 floors, then up 3 more floors, down one floor, up 3 floors and then down 9 floors. Write down all the places that she visited.

g. Gianni starts on level G, travels to level -2, then to level 3, followed by level 1, then back to level G. Describe Gianni's movements on the lift.

Siena Shopping Village Directory

Store	Level
Appliances	5
Medical Centre	4
Post Office/Newsagent	3
Greengrocer	2
Supermarket	1
Butcher/Bakery	G
Delicatessen	-1
Laundromat	-2
Customer Service	-3
Car Park A	-4



Indices, Squares and Square Roots

Using Index Numbers

This activity explores how index numbers can be used to simplify numerical expressions. Task A asks students to simplify expressions while Task B asks students to expand simplified expressions. Task C can be used to allow more capable students further exploration of the index laws.

Place Value Revisited

Students are encouraged to explore how place value can be expressed using index notation. This task will help students progress to using and understanding scientific notation. Task C allows students to explore how the powers of 10 are used in real life to explore the scale of our universe. This might be a nice activity to explore as a class.

Expressions with Indices

This activity extends using index notation in a more generalised context, using variables to represent numbers. Task B is more advanced and will demonstrate whether students have a strong grasp of these concepts. Task C allows students to use their creativity while also demonstrating their success in consolidating these core concepts.

Prime Factor Trees

This task allows students to revisit their use and understanding of prime factor trees. This activity extends this understanding further by asking students to simplify their answers using index notation.

Easy Calculations Using Prime Factors

This activity exposes students to the power of expressing numbers in terms of their

prime factors. By expressing two numbers in a multiplication calculation by their prime factorisation, the calculation can be made easier and more efficient.

A Different Approach to the Lowest Common Multiple

Many students determine the LCM for two or more numbers by the more inefficient method of listing numbers. Here students are shown how Prime Factor Trees can make the task easier and more efficient.

A Different Approach to the Highest Common Factor

Many students determine the HCF for two or more numbers by the more inefficient method of listing numbers. Here students are shown how Prime Factor Trees can make the task easier and more efficient.

Square Numbers

This activity serves as a refresher exercise for looking at square numbers. Task A is a simple recall task while Task B allows students to explore the x^2 function on their calculator. Task C is slightly more challenging, allowing students to explore a pattern involved in squaring a particular type of number. Discussion of their findings with the class is encouraged.

Square Root

In this activity students explore the inverse of the squaring operation, namely the square root. Students are encouraged to estimate values and also employ technology to calculate values to an appropriate number of decimal places.

★ Using Index Numbers

Instead of writing out long calculations, we can sometimes use index numbers or powers to write a shorter expression.

★ TASK A For each of the following expressions, write a shorter, simplified expression. Questions a and c has been partially completed for you.

- a. $2 \times 2 \times 3 \times 2 \times 3 \times 3 \times 2 = 2^4 \times 3^3$
- b. $5 \times 5 \times 6 \times 5 \times 5 \times 7 \times 7 \times 6 \times 5 = \boxed{}$
- c. $\frac{3 \times 3 \times 2 \times 3 \times 2 \times 4 \times 2}{2 \times 2 \times 3 \times 4} = 3^2 \times 2^2 \times 4$
- d. $\frac{10 \times 10 \times 4 \times 10 \times 4 \times 4 \times 6 \times 6}{10 \times 4 \times 4 \times 6 \times 10} = \boxed{}$
- e. $\frac{7 \times 7 \times 7 \times 2 \times 2 \times 3 \times 7 \times 2}{3 \times 3 \times 2 \times 7 \times 7 \times 3} = \boxed{}$
- f. $3 \times 2 \times 3 \times 3 \times 4 \times 2 \times 4 \times 2 \times 3 \times 2 \times 4 = \boxed{}$
- g. $6 \times 4 \times 2 \times 6 \times 6 \times 4 \times 4 \times 2 \times 4 \times 3 \times 6^4 \times 2^5 = \boxed{}$
- h. $\frac{5^5 \times 3^2 \times 4^7}{3 \times 3 \times 4 \times 4 \times 4 \times 3 \times 5 \times 5 \times 5 \times 5} = \boxed{}$

★ TASK B Write each of the following expressions (which are in index form) in expanded form. In other words, write them as they would appear before they were simplified.

- a. $4^3 \times 5^2 \times 6^7$
- b. $(-3)^4 \times 12^2 \times 7^3$
- c. $\frac{3^6 \times 10^3 \times 15^2}{10^2 \times 15^4}$
- d. $(2^3 \times 6^2)^2$
- e. $(7^2 \times 4^{5 \times 3^3})^4$
- f. $\frac{(4^2 \times 11^3)^2}{(3^4 \times 7^2)^3}$

★ TASK C: RESEARCH CHALLENGE

In the work that you have done in Task A and Task B, you have discovered a few of what we call the Index Laws. In small groups, research as many Index Laws as you can find. Create a poster showing all these Index Laws and make sure that you include some examples to show how each one works.

Calculations and Algebraic Generalisations

How We Calculate

This activity exposes students to the correct use of BMDAS in conducting calculations. Students are very strongly encouraged to show all their working out to ensure that they can demonstrate the method clearly.

Get the Order Right

This activity builds on the previous activity and allows students to further practice using the correct order of operations. Task B will help students understand the benefit of showing all their working out. Students are to examine these “solutions” for errors and to then correct the errors that they see. Students will have achieved excellent consolidation with their success in this task.

Calculations with Formulas

This task shows students the real life use of formulas. Task A teaches students how to substitute into formulas and calculate correctly using BMDAS. Task B exposes students to a variety of different formulas. Task C is a research task where students can explore various financial formulas.

Scientific Formulas

This activity builds on the skills learned in the previous task. Students will use and substitute into a variety of real scientific formulas which will complement the work that they undertake in the science curriculum. Task C extends these concepts by asking students to informally solve equations. This concept is visited in detail in the final section of the book.

Create Your Own Formula

In this activity students are asked to read information and transform it into a formula. Many of these formulas appear in real life and contexts which students can understand. Translating real life mathematical processes into mathematical symbols is an important higher order skill.

Catching a Taxi

The first activity allows students to explore the visual representation of a commonly used function and exposes students to the fact that functions are represented by an equation, a table of values and a graph. This activity makes a strong introduction to future function work.

Electrician and the Plumber

Similar to the “Catching a Taxi” task, this activity provides students with another readily accessible example of the various representation of functions.

How We Calculate

When we have a few calculations to perform, all in the same question, how do we know which ones to do first? We follow the mathematical rules of BIMDAS.

For example, if we want to calculate $-10 \div 5 \times 3 + (7 - 4)^2$, we follow the rules of BIMDAS as shown below.

$$\begin{aligned} &= -10 \div 5 \times 3 + (3)^2 && \leftarrow \text{Inside the brackets first.} \\ &= -10 \div 5 \times 3 + 9 && \leftarrow \text{Use the power, calculate } 3^2. \\ &= -2 \times 3 + 9 && \leftarrow \text{Working left to right, we divide first.} \\ &= -6 + 9 && \leftarrow \text{Multiply next.} \\ &= 3 && \leftarrow \text{Calculate last.} \end{aligned}$$

Brackets
Indices (powers)
Multiplication
Division
Addition
Subtraction

Remember: When there is a string of addition and subtraction or a string of multiplication and division, we simply calculate from left to right.

Calculate each sum below using the laws of BIMDAS. Set out your working as shown above.

a. $2 - (5 - 2)^3$

b. $-7 + 2 \times (-4) - 5$

c. $2^3 - 10 \div 5$

d. $14 \times (-2) \div 7 - 8 \times 3$

e. $100 \div 20 \times -3 - 5^2$

f. $10 - 3 + 4 - 2 \times (-12)$

g. $(4 \times 5 - 13)^2 + 3 \times (-2)$

h. $12 - 24 \div (-3) \times 2$

i. $5 \times (-6) \div 15 - 7 - 3 + 12$