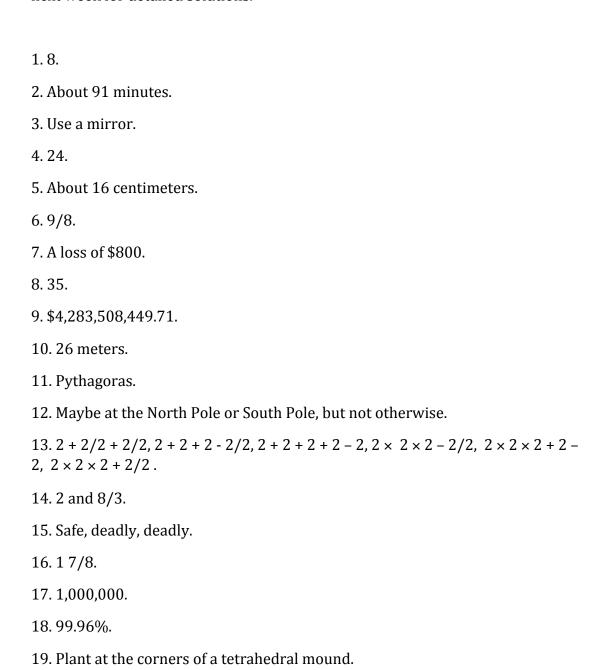# MATHS CHALLENGE ANSWERS

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Here are our answers to The Age Maths Challenge. Check back at our website next week for detailed solutions.

1. 8.

2. About 91 minutes.

3. Use a mirror.

4. 24.

5. About 16 centimeters.

6. 9/8.

7. A loss of $800.

8. 35.

9. $4,283,508,449.71.

10. 26 meters.

11. Pythagoras.

12. Maybe at the North Pole or South Pole, but not otherwise.

13. $2 + 2/2 + 2/2$, $2 + 2 + 2 - 2/2$, $2 + 2 + 2 + 2 - 2$, $2 \times 2 \times 2 - 2/2$, $2 \times 2 \times 2 + 2 - 2$, $2 \times 2 \times 2 + 2/2$.

14. 2 and 8/3.

15. Safe, deadly, deadly.

16. 1 7/8.

17. 1,000,000.

18. 99.96%.

19. Plant at the corners of a tetrahedral mound.

20. 31.

21. √2 to 1. A4 paper and other standard paper sizes have these proportions.

22. It's a magic square, and is also a magic square upside down. In both cases all rows, columns and diagonals sum to 264.

23. All are fractions with denominator 11.

24. 2.

25. Fill 5-Jug, move 3 gallons to 3-Jug and empty 3-Jug. Move remaining 2 gallons from 5-Jug to 3-Jug. Fill 5-Jug, and use 1 gallon to fill 3-Jug. The second problem is impossible.

26. Every symbol is a digit and its mirror image glued together. Next comes 8.

27. The same.

28. 49.

29. Start both. When the 4-glass stops, turn it over. When the 7-glass stops, there is one minute left in the 4-glass. Turn the 7-glass over. When the 4-glass runs out, 8 minutes have passed and 1 minute has run in the 7-glass. Turn the 7-glass over.

30. Form a 3–4–5 triangle.

31. 1/3.

32. If there are an even number of squares then the person who breaks first wins, and otherwise the second person wins.

33. Queen of Hearts, Queen of Spades, and King of Spades.

34. $(1 + \sqrt{5})/2$, the golden ratio.

35. 15 kilometers per hour.

36. All except the regular pentagon are possible.

37. 1/2.

38. 1.

39. Set the corner of the book at a point on the perimeter of the circle, and draw a right angle using the edges of the book, and see where the lines intersect the circle.

40. 22/7 (anyone who answered π fails immediately!).

41. The trip is possible for the king and queen, and impossible for the others.

42. One mile.

43. 2/5.

44. The trip is impossible.

45. 89.

46. 18.

47. About 25 students.

48. 2, 2 and 9.

49. 20 squares, no equilateral triangles.

50. 44.

51. All are possible.

52. 32 8/11 minutes after midnight. It is impossible for the three hands to be equally spaced.

53. 6 different lacings. The first diagrammed lacing is the shortest.

54. The amounts level off to 2.71828 ...., known as Euler's number *e*.

55. 1/6 for the octahedron, and 1/3 for the tetrahedron.

56. 1321232116.

57. A skull.

58. 1 1/5 meters.

59. Yes.

60. The pink lens on the left has area $\pi/2 - 1$. The yellow curvy square on the right has area $1 - \sqrt{3} + \pi/3$.