Answer Key:

1. **B**
2. **D**
3. **C**
4. **D**
5. **A**
6. **C**
7. **A**
8. **D**
9. **D**
10. **B**
11. **A**
12. **B**
13. **D**
14. **E** – lawyer
15. **C**
16. **A**
17. **A**
18. **B**
19. **C**
20. **D**
21. **C**
22. **C**
23. **B**
24. **E** – Laplace
25. **D**
26. **A**
27. **C**
28. **B**
29. **B**
30. **D**

Solutions:

1. **B** : The number 7213 in Babylonian would be $20 \cdot 60^1 + 13 \cdot 60^0$, which is not the one given. The other choices are correct interpretations: A is $12 \cdot 60 + 13$, C is $12 \cdot 60^2 + 13$, and D is $12 \cdot 60^2 + 13 \cdot 60$.

2. **D** : This represents $2 \cdot 1000 + 2 \cdot 10 + 5 \cdot 1 = 2025$. The other choices are, in order, 2205, 2250, and 225.

3. **C** : "The simple false position technique is found in cuneiform tablets from ancient Babylonian mathematics, and in papyri from ancient Egyptian mathematics." https://en.wikipedia.org/wiki/Regula_falsi

4. **D** : From https://en.wikipedia.org/wiki/Zeno_of_Elea; see the first three paragraphs and the subsection on the paradoxes themselves.

5. **A** : "In mathematics, two non-zero real numbers a and b are said to be commensurable if their ratio a/b is a rational number; otherwise a and b are called incommensurable." https://en.wikipedia.org/wiki/Commensurability_(mathematics)

6. **C** : "Doubling the cube, also known as the Delian problem, is an ancient geometric problem. Given the edge of a cube, the problem requires the construction of the edge of a second cube whose volume is double that of the first. As with the related problems of squaring the circle and trisecting the angle, doubling the cube is now known to be impossible to construct by using only a compass and straightedge, but even in ancient times solutions were known that employed other methods." https://en.wikipedia.org/wiki/Doubling_the_cube

7. **A** : "In [Khayyam's] later work, the *Treatise on Demonstration of Problems of Algebra*, he wrote a complete classification of cubic equations with general geometric solutions found by means of intersecting conic sections." https://en.wikipedia.org/wiki/Cubic_equation

8. **D** : "In geometry, the theorem that the angles opposite the equal sides of an isosceles triangle are themselves equal is known as the *pons asinorum*, Latin for 'bridge of asses', or more descriptively as the isosceles triangle theorem." https://en.wikipedia.org/wiki/Pons_asinorum

9. **D** : "The *Liber Abaci* or *Liber Abbaci* (Latin for 'The Book of Calculation') was a 1202 Latin work on arithmetic by Leonardo of Pisa, posthumously known as Fibonacci. It is primarily famous for helping popularize Arabic numerals in Europe." https://en.wikipedia.org/wiki/Liber_Abaci

10. **B** : "Qin wrote *Shùshū Jiǔzhāng* ('Mathematical Treatise in Nine Sections') in 1247 CE. This treatise covered a variety of topics including indeterminate equations and the numerical solution of certain polynomial equations up to 10th order, as well as discussions on military matters and surveying. In the treatise Qin included a general form of the Chinese remainder theorem that used *Da yan shu*, or algorithms, to solve it." https://en.wikipedia.org/wiki/Qin_Jiushao

11. **A** : "The work was originally thought to be lost, but in 1906 was rediscovered in the celebrated Archimedes Palimpsest." https://en.wikipedia.org/wiki/The_Method_of_Mechanical_Theorems

12. **B** : "Napier's formulation was awkward to work with, but the book fired Briggs' imagination – in his lectures at Gresham College he proposed the idea of base 10 logarithms in which the logarithm of 10 would be 1..." https://en.wikipedia.org/wiki/Henry_Briggs_(mathematician)

13. **D** : "When Tycho Brahe died in 1601, Kepler became the official imperial mathematician. By studying Brahe's data, he found his three laws of planetary motion, which he published in 1609 and 1619." https://en.wikipedia.org/wiki/Rudolphine_Tables

14. **E** : Fermat was a lawyer: "Pierre de Fermat was a French lawyer and government official most remembered for his work in number theory; in particular for Fermat's Last Theorem." https://mathshistory.st-andrews.ac.uk/Biographies/Fermat/

15. **C** : "Fluxion, in mathematics, the original term for derivative (q.v.), introduced by Isaac Newton in 1665." https://www.britannica.com/science/fluxion

16. **A** : "Newton stayed up all night to solve it and mailed the solution anonymously by the next post. Upon reading the solution, Bernoulli immediately recognized its author, exclaiming that he 'recognizes a lion from his claw mark'." https://en.wikipedia.org/wiki/Brachistochrone_curve

17. **A** : "In 1669 Barrow resigned from the Lucasian Chair and did no further mathematical work. This allowed Newton to take over." https://mathshistory.st-andrews.ac.uk/Biographies/Barrow/

18. **B** : "Torricelli was the first person to create a sustained vacuum and to discover the principle of a barometer. In 1643 he proposed an experiment, ..." https://mathshistory.st-andrews.ac.uk/Biographies/Torricelli/

19. **C** : "Newton decided to leave Cambridge to take up a government position in London becoming Warden of the Royal Mint in 1696 and Master in 1699." https://mathshistory.st-andrews.ac.uk/Biographies/Newton/

20. **D** : "When Germain was 13, the Bastille fell, and the revolutionary atmosphere of the city forced her to stay inside. For entertainment, she turned to her father's library." https://en.wikipedia.org/wiki/Sophie_Germain

21. **C** : Euler's constant γ, 1734: https://en.wikipedia.org/wiki/Euler%27s_constant; Euler's formula $e^{ix} = \cos x + i \sin x$, 1748: https://en.wikipedia.org/wiki/Euler%27s_formula; Euler's polyhedron formula $V - E + F = 2$, 1758: https://en.wikipedia.org/wiki/Euler_characteristic; Euler's totient function ϕ, 1763: https://en.wikipedia.org/wiki/Euler%27s_totient_function

22. **C** : "These attempts culminated when the Russian Nikolay Lobachevsky (1829) and the Hungarian János Bolyai (1831) independently published a description of a geometry that, except for the parallel postulate, satisfied all of Euclid's postulates and common notions. It is this geometry that is called hyperbolic geometry." https://www.britannica.com/science/non-Euclidean-geometry

23. **B** : "Hamilton made his discovery of the algebra of quaternions in 1843.. . . " https://en.wikipedia.org/wiki/William_Rowan_Hamilton

24. **E** : He was Laplace: "Sometimes referred to as the French Newton or Newton of France, . . . " https://en.wikipedia.org/wiki/Pierre-Simon_Laplace

25. **D** : "Although the pigeonhole principle appears as early as 1624 in a book attributed to Jean Leurechon, it is commonly called Dirichlet's box principle or Dirichlet's drawer principle after an 1834 treatment of the principle by Peter Gustav Lejeune Dirichlet. . . " https://en.wikipedia.org/wiki/Pigeonhole_principle

26. **A** : "1874: Russian mathematician Sofia Kovalevskaya became the first woman in modern Europe to gain a doctorate in mathematics, which she earned from the University of Göttingen in Germany." https://en.wikipedia.org/wiki/Timeline_of_women_in_mathematics

27. **C** : https://en.wikipedia.org/wiki/Paul_Erd?s

28. **B** : "American mathematician, electrical engineer, computer scientist and cryptographer known as the 'father of information theory' and as the 'father of the Information Age'. Shannon was the first to describe the Boolean gates (electronic circuits) that are essential to all digital electronic circuits, and was one of the founding fathers of artificial intelligence." https://en.wikipedia.org/wiki/Claude_Shannon

29. **B** : "Terence Tao is the youngest bronze, silver, and gold medalist, respectively, in IMO history." https://en.wikipedia.org/wiki/List_of_International_Mathematical_Olympiad_participants

30. **D** : "1998: Melanie Wood became the first female American to make the U.S. International Math Olympiad Team. She won silver medals in the 1998 and 1999 International Mathematical Olympiads." https://en.wikipedia.org/wiki/Timeline_of_women_in_mathematics