8 How to • • • • • • • • • • Calculate Time with Clocks, Calendars, and Eras

Facts to Know

Time

A.M. = morning - 12:00 A.M. (midnight) to 11:59 A.M.
P.M. = afternoon - 12:00 P.M. (noon) to 11:59 P.M.
60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1 day

To compute elapsed time within the morning or within the afternoon, subtract the smaller number from the larger number. Remember to regroup (borrow) with 60 minutes.

Sample

Because you cannot subtract 0 minutes from 38 minutes, subtract 1 hour from the 9:00 P.M. and convert it to 60 minutes. So when you calculate how much time elapsed between 9:00 P.M. and 7:38 p.m., the final answer is 1 hour 22 minutes.

8:60
~~9:00~~ P.M.
– 7:38 P.M.
1:22 (1 hr 22 min)

To add elapsed time, add the two measurements of time together.

Sample

When you add the two measurements of time together, you have an answer of 218 days 49 hrs 60 min, but you know that you convert some of the minutes to hours and some hours into days. Using the chart at the top of the page, you know that 24 hours = 1 day so 49 hours = 2 days 1 hour. Similarly, you know that 60 minutes = 1 hour so after you made all the conversions, the final answer is 220 days and 2 hours have elapsed.

206 days 2 hrs 5 min
+ 12 days 47 hrs 55 min
218 days 49 hrs 60 min = 220 days 2 hrs

Calendar Facts

7 days = 1 week	28-Day Month	31-Day Months
52 weeks = 1 year	February (29 days in leap year)	January
10 years = 1 decade		March
10 decades = 1 century	30-Day Months	May
10 centuries = 1 millennium	September	July
	April	August
	June	October
	November	December

- Time from the approximate date of the birth of Christ until the present moves progressively from 1 to 2000 +. It is called A.D. (anno domini—in the year of our Lord).
- Time before the birth of Christ counts back from 1 to the earliest recorded history, about 5,000 years. It is called B.C. (before Christ) or B.C.E. ("before the common era").
- To compute the passage of years within B.C. or within A.D., subtract the lower number from the higher number.
- To compute the passage of years from B.C. to A.D., add the B.C. date to the A.D. date.

8 Practice • • • • • • • • • • • • • • • • • Using a Calendar

February

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29				

March

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Directions: Study the two calendars above which are for consecutive months. Use the information on page 33 to help you answer the following questions.

1. Which two months of the year are shown above? _____ _____
2. How do you know which months are shown?_____
3. What is the date exactly 2 weeks after February 5th?_____
4. What is the date exactly 6 weeks after February 22nd? _____
5. What is the date exactly 5 weeks after Lincoln's Birthday (February 12th)?_____
6. How many Fridays are in March? _____
7. How many days were in the month before the first calendar? _____
8. How many days are left in the year after the second calendar? _____
9. What date is the 61st day of the year on this calendar? _____
10. What date is the 360th day of this year? _____
11. Easter was the fourth Sunday of April on the calendar year shown above.

    What was the date? _____
12. What day of the week is May 1?_____

8 Practice • • • • • • • • • • Computing Time Before and After the Present Era

This is a time line of important math inventions and discoveries.

B.C.

c. 2000 B.C.
The Babylonians developed a form of place value based on the number 60.

c. 1800 B.C.
The Babylonians developed a multiplication table.

c. 1700 B.C.
The Sumerians discovered squares and square roots and a value for pi.

c. 1350 B.C.
The Chinese developed decimals.

c. 1000 B.C.
The Chinese developed a primitive abacus.

c. 300 B.C.
Euclid, a Greek mathematician, wrote a textbook on geometry and the theory of numbers.

c. 100 B.C.
Chinese mathematicians used negative numbers.

A.D.

876 A.D.
The symbol for zero was used in India.

1202 A.D.
Arabic numerals were introduced in Europe.

1492 A.D.
The decimal point was first used.

1514 A.D.
Plus and minus signs were used in equations.

1525 A.D.
The symbol for square roots ($\sqrt{\ }$) was first used.

1617 A.D.
John Napier invented Napier's Bones, an efficient calculating device.

c. 1622 A.D.
The slide rule was invented to improve speed in calculations.

1631 A.D.
The multiplication sign (x) was first used.

1637 A.D.
Descartes developed the coordinate system.

1642 A.D.
Blaise Pascal invented an adding machine.

1666 A.D.
Isaac Newton developed calculus.

1813 A.D.
The tangram first appeared in print.

1946 A.D.
The first digital computer, ENIAC, was invented.

Directions: Use the information on page 33 and this time line to do these computations. Use the date of the current year to calculate the solutions to these problems.

1. How many years ago was the slide rule invented? _____
2. How many years ago did the Babylonians develop a multiplication table? _____
3. How many years ago was the multiplication sign first used? _____
4. How many years ago did the tangram first appear in print? _____
5. How many years ago did the Chinese develop the abacus? _____
6. How many years ago did the Chinese begin to use negative numbers? _____
7. How many years ago did Napier's Bones get invented? _____
8. How many years ago did Newton develop calculus? _____

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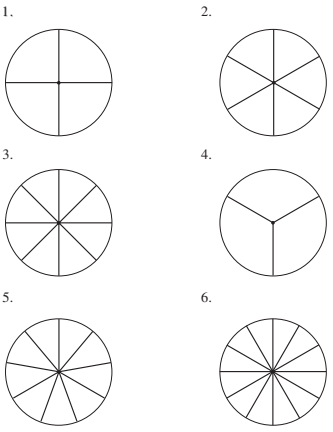


Page 34

1. 3 hr 35 min
2. 1 hr 40 min
3. 6 hr 25 min
4. 6 hr 55 min
5. 2 hr 35 min
6. 8 hr 6 min
7. 7 hr 56 min
8. 2 hr 16 min
9. 190 days 13 hr 32 min
10. 91 days 3 hr 39 min
11. 34 wk 3 days 14 hr 40 min
12. 15 wk 6 days 5 hr 6 min
13. 26 days 12 hr 34 min
14. 13 days 19 hr 25 min

Page 35

1. Feb./Mar.
2. Ending in 29, the first month must be February.
3. Feb. 19th
4. Apr. 4th
5. Mar. 18th
6. 5
7. 31 days
8. 275 days
9. Mar. 1
10. December 26th
11. April 23rd
12. Monday

Page 36

(dates as of year 2000)

1. 378 yr.
2. 3,800 yr.
3. 369 yr.
4. 187 yr.
5. 3,000 yr.
6. 2,100 yr.
7. 383 yr.
8. 334 yr.

Page 38

1. 70° F
2. 32° F
3. 98° F
4. 20° F
5. 50° F
6. 98.6° F; .4° F
7. 52° F
8. 32° F
9. 180° F
10. 113.4° F
11. 4.4° F
12. 72° F
13. 29.4° F
14. 112° F

Page 39

1. 20° C
2. 33° C
3. 98° C
4. 50° C
5. 10° C
6. 20° C
7. 122° F uncomfortably hot
8. 0° C
9. 22° C
10. 40° C
11. 50° C
12. 89° C
13. C. short sleeves
14. E. swim suit
15. B. ice skates
16. D. light jacket
17. A. heavy parka

Page 40

1. 4° C
2. 20° C
3. 38° C
4. 27° C
5. 0° C
6. 100° C
7. 77° F
8. 50° F
9. 99° F (98.6° F)
10. 167° F
11. 86° F
12. 140° F

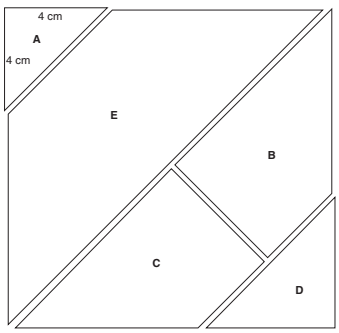
Page 41

1. 9 m.p.h.
2. 45 miles
3. 50 m.p.h.
4. 43.75 m.p.h.
5. 11.2 m.p.h.
6. 168 miles
7. 270 miles
8. 578.5 m.p.h.
9. 107.8 m.p.h.
10. 135 m.p.h.

Page 42

1. 10 hr.
2. 3 hr.
3. 2.5 hr.
4. 7 m.p.h.
5. 7.5 hr.
6. 52.5 m.p.h.
7. 787.5 hr.
8. 117.5 hr.
9. 13.5 hr.
10. 15 hr.

Page 43



Area of square = 144 cm^2
Area of parts (A + B + C + D + E) = 144 cm^2
Possible steps to finding the areas of each part:
To find the area of section E (64 cm^2), subtract the area of A (8 cm^2) from the area of one-half the square (72 cm^2).
Section B and section C are congruent. Sections B, C, and D make up one-half the square.
To find the area of B (30), subtract the area of D (12 cm^2) from the areas of B + C + D (72 cm^2), and then divide that difference by 2.
Section areas in square centimeters: A = 8, B = 30, C = 30, D = 12, E = 64
The sum of the parts (8 + 30 + 30 + 12 + 64) = the whole (144).

Pages 44 and 45

Answers will vary.

Page 46

1. 944 $mi.^2$
2. 387,823 $mi.^2$
3. 654,879 $mi.^2$
4. Illinois
5. Montana

6.–7. Answers will vary.

