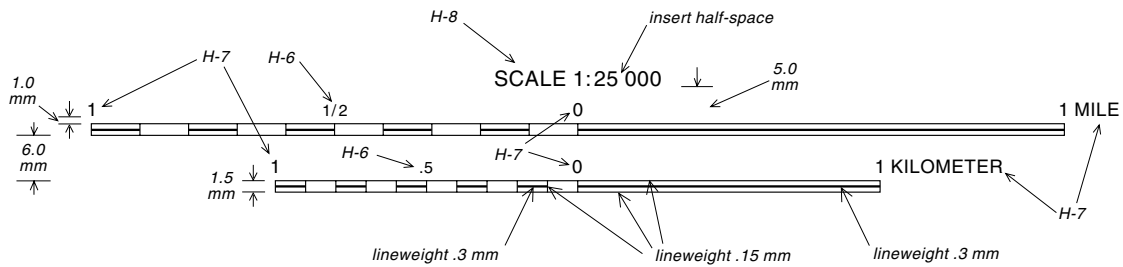


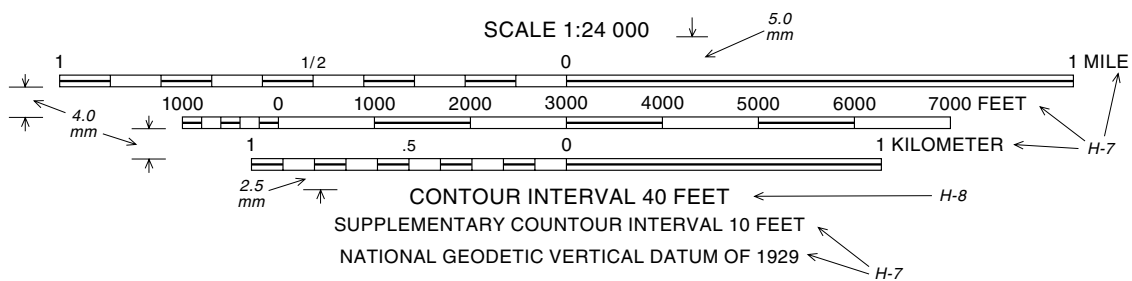
35—BAR SCALES

CARTOGRAPHIC SPECIFICATIONS

2 UNITS OF MEASUREMENT:



3 UNITS OF MEASUREMENT:



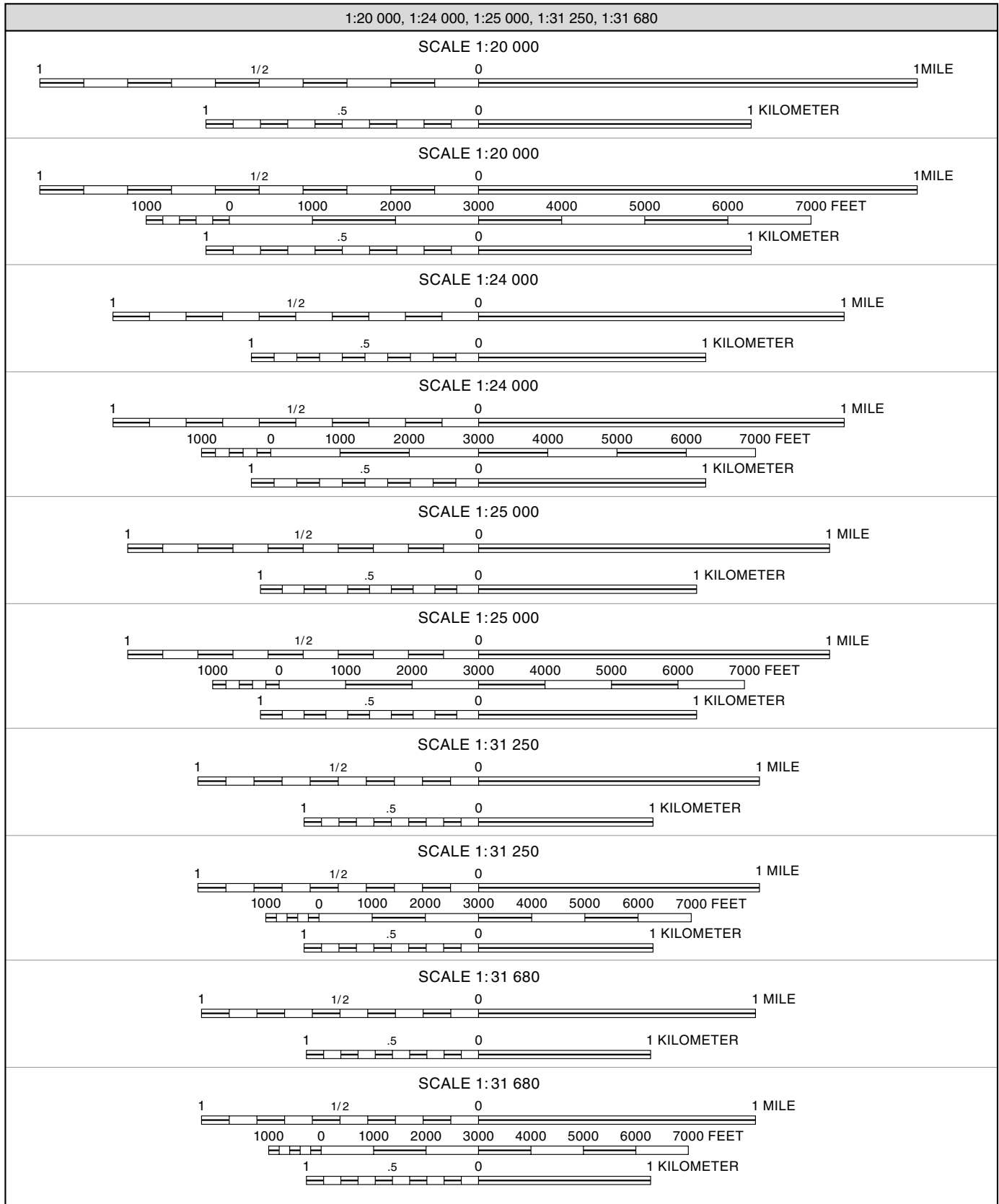
NOTES ON USAGE

Bar scales shown have been designed to use with a quadrangle-sized (1:24,000-scale) map. For other sizes and scales of maps, bar scales should be approximately one-third of the width of the map area, but usually not longer than 180 mm. See accompanying tables for various bar-scale calculations, as well as how to draw scales not shown.

DISTANCE MEASURES		MEASUREMENT EQUIVALENTS	
1 mile (mi)	= 63,360 inches (in) = 5,280 feet (ft)	Metric	English
1 kilometer (km)	= 3,280.833 ft = 0.62137 mi	1 millimeter (mm)	= 1/10 cm = 1/1000 m = 0.039 in
		1 centimeter (cm)	= 10 mm = 1/100 m = 0.393 in
		1 meter (m)	= 100 cm = 1,000 mm = 1/1,000 km = 39.37 in or 3.28 ft or 0.00062 mi
		1 kilometer (km)	= 1,000 m = 100,000 cm = 1,000,000 mm = 3,280.833 ft or 0.62137 mi

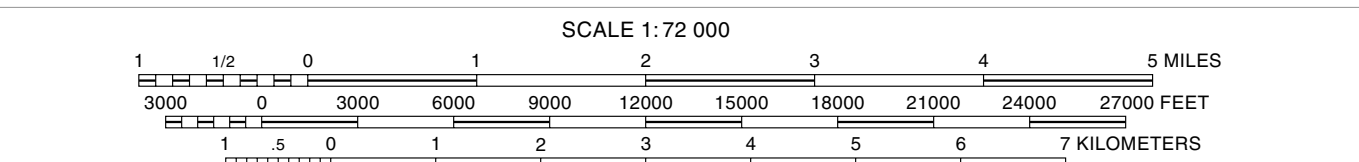
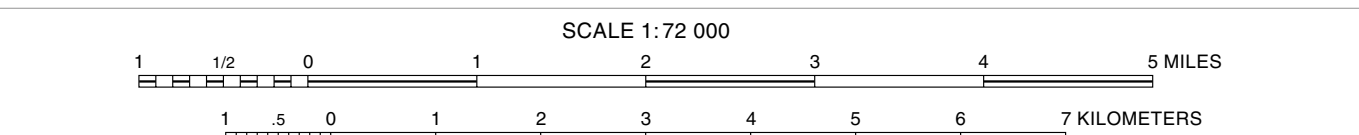
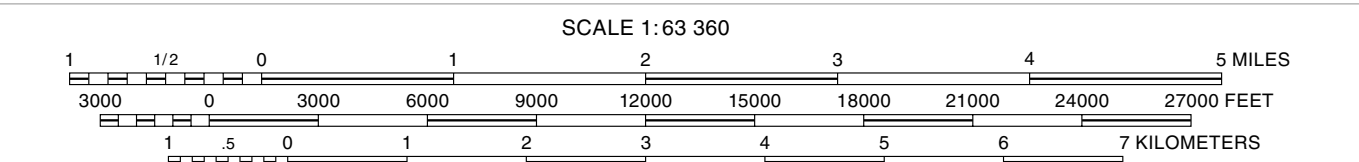
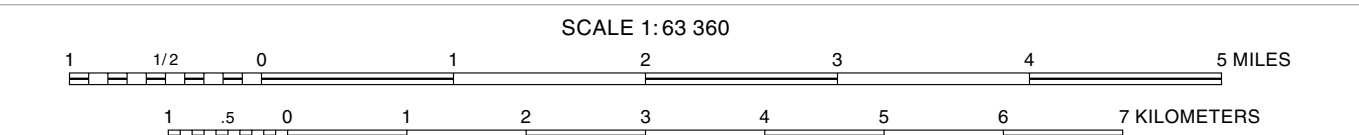
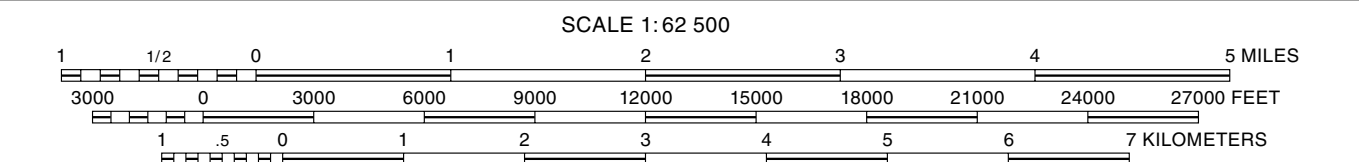
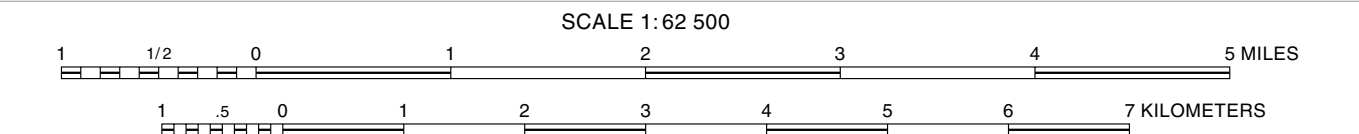
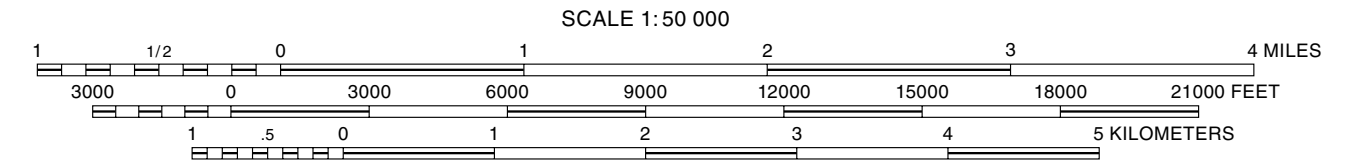
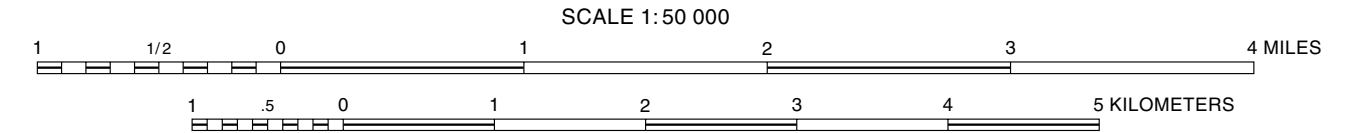
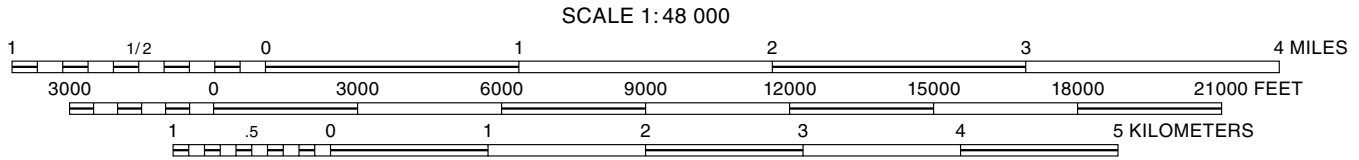
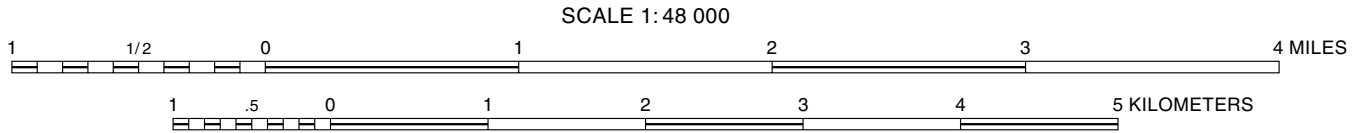
35—BAR SCALES (continued)

1:20 000, 1:24 000, 1:25 000, 1:31 250, 1:31 680



35—BAR SCALES (continued)

1:48 000, 1:50 000, 1:62 500, 1:63 360, 1:72 000



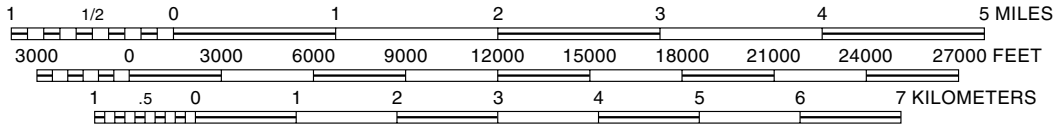
35—BAR SCALES (continued)

1:75 000, 1:96 000, 1:100 000, 1:125 000, 1:150 000, 1:250 000, 1:400 000, 1:500 000, 1:750 000

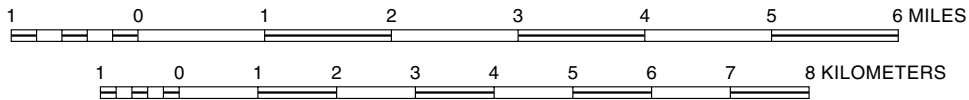
SCALE 1:75 000



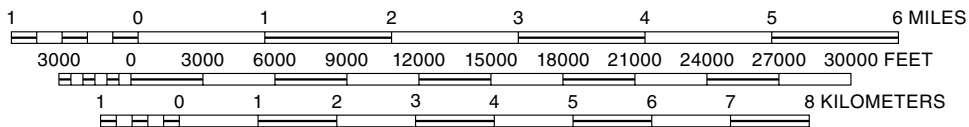
SCALE 1:75 000



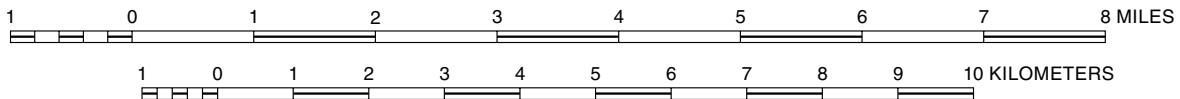
SCALE 1:96 000



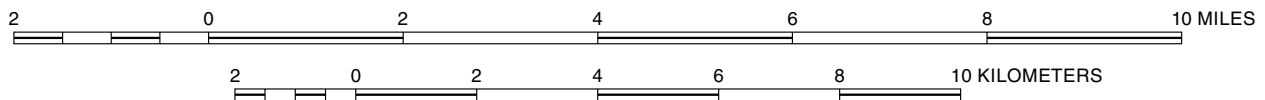
SCALE 1:96 000



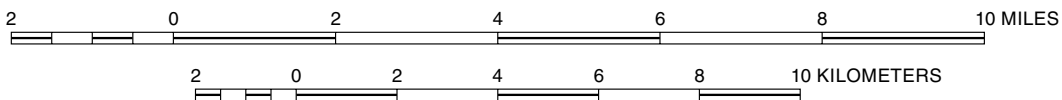
SCALE 1:100 000



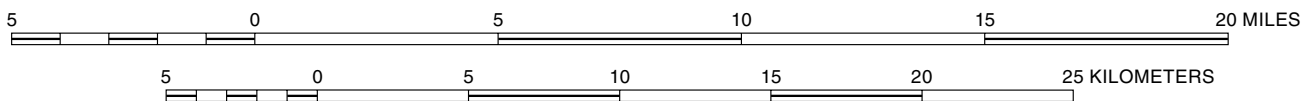
SCALE 1:125 000



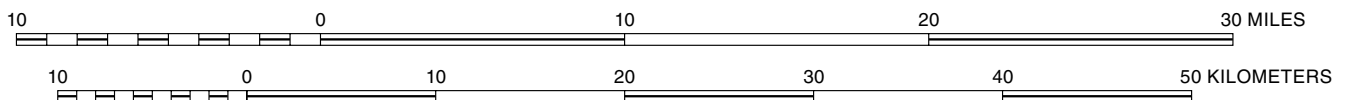
SCALE 1:150 000



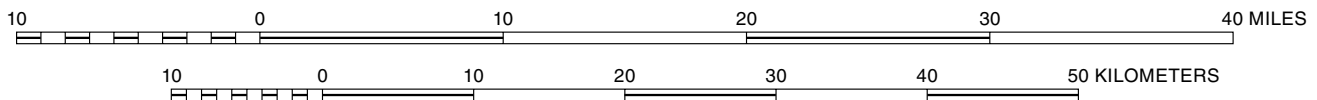
SCALE 1:250 000



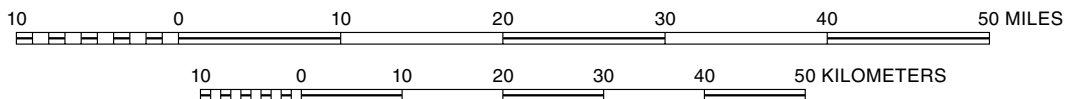
SCALE 1:400 000



SCALE 1:500 000

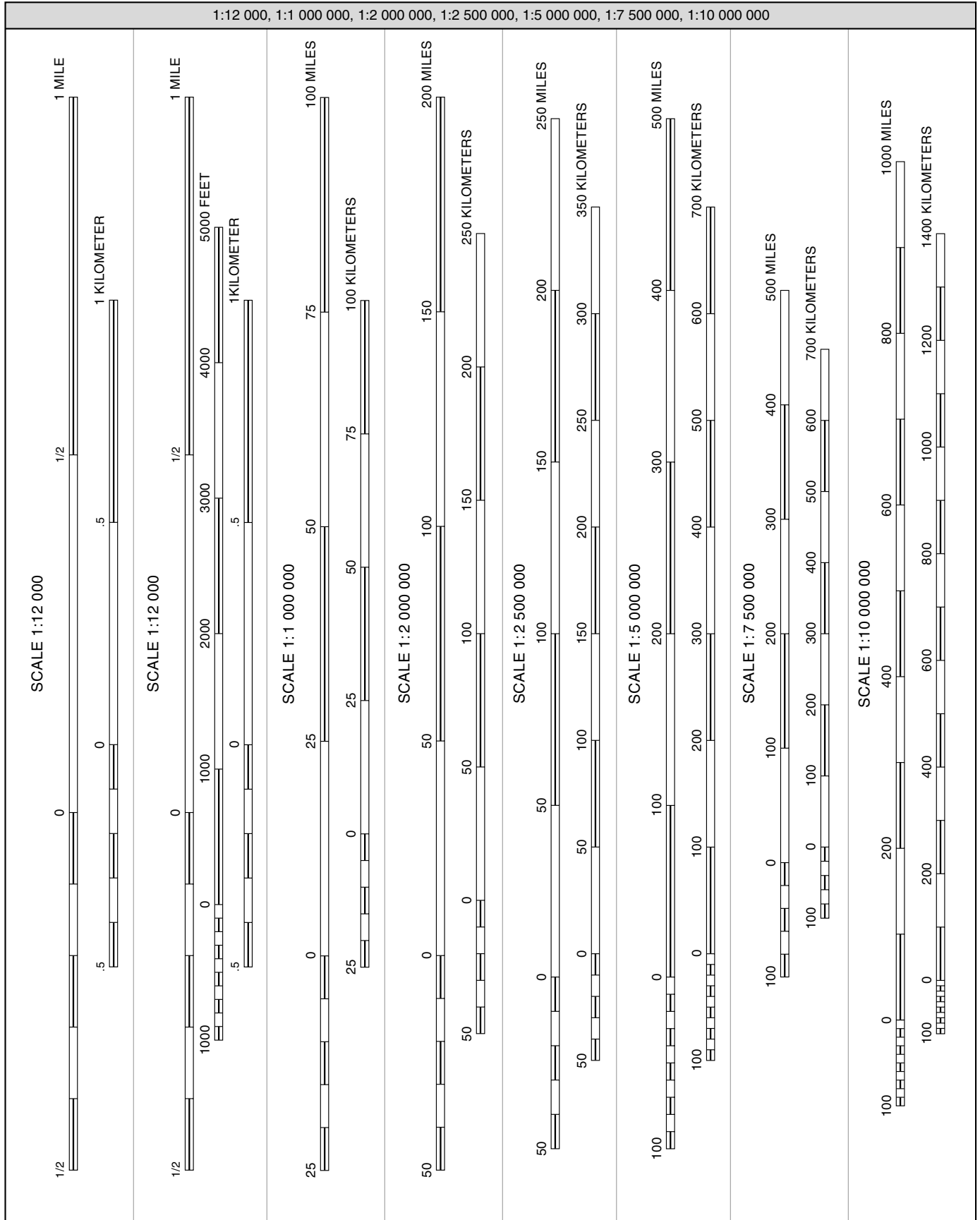


SCALE 1:750 000



35—BAR SCALES (continued)

1:12 000, 1:1 000 000, 1:2 000 000, 1:2 500 000, 1:5 000 000, 1:7 500 000, 1:10 000 000



35—BAR SCALES (continued)

BAR SCALE CALCULATIONS — MILES (1 mile = 63,360 inches)							
FRACTIONAL SCALE	SCALE TO MAP REPRESENTATION		TO FIND MILES PER INCH (x in ratio)	MILES PER INCH	TOTAL MILES ON SCALE	TO FIND TOTAL SCALE LENGTH IN INCHES (y in ratio)	TOTAL SCALE LENGTH (INCHES)
	Scale Unit :	represents Map Unit	Use ratio below or $\frac{\text{SCALE}}{63\ 360}$			Use ratio below or $\frac{\text{Miles on scale}}{\text{Miles per inch}}$	
1:12 000	1 inch	12 000 in	$\frac{63\ 360}{1} = \frac{12\ 000}{x}$	0.1893939	1.5	$\frac{0.1893939}{1} = \frac{1.5}{y}$	7.920
1:20 000	1 inch	20 000 in	$\frac{63\ 360}{1} = \frac{20\ 000}{x}$	0.3156565	2	$\frac{0.3156565}{1} = \frac{2}{y}$	6.336
1:24 000	1 inch	24 000 in	$\frac{63\ 360}{1} = \frac{24\ 000}{x}$	0.3787878	2	$\frac{0.3787878}{1} = \frac{2}{y}$	5.280
1:25 000	1 inch	25 000 in	$\frac{63\ 360}{1} = \frac{25\ 000}{x}$	0.3945707	2	$\frac{0.3945707}{1} = \frac{2}{y}$	5.068
1:31 250	1 inch	31 250 in	$\frac{63\ 360}{1} = \frac{31\ 250}{x}$	0.4932133	2	$\frac{0.4932133}{1} = \frac{2}{y}$	4.055
1:31 680	1 inch	31 680 in	$\frac{63\ 360}{1} = \frac{31\ 680}{x}$	0.500	2	$\frac{0.500}{1} = \frac{2}{y}$	4.000
1:48 000	1 inch	48 000 in	$\frac{63\ 360}{1} = \frac{48\ 000}{x}$	0.7575757	5	$\frac{0.7575757}{1} = \frac{5}{y}$	6.600
1:50 000	1 inch	50 000 in	$\frac{63\ 360}{1} = \frac{50\ 000}{x}$	0.7891414	5	$\frac{0.7891414}{1} = \frac{5}{y}$	6.336
1:62 500	1 inch	62 500 in	$\frac{63\ 360}{1} = \frac{62\ 500}{x}$	0.9864267	6	$\frac{0.9864267}{1} = \frac{6}{y}$	6.082
1:63 360	1 inch	63 360 in	$\frac{63\ 360}{1} = \frac{63\ 360}{x}$	1.000	6	$\frac{1.000}{1} = \frac{6}{y}$	6.000
1:72 000	1 inch	72 000 in	$\frac{63\ 360}{1} = \frac{72\ 000}{x}$	1.1363636	6	$\frac{1.1363636}{1} = \frac{6}{y}$	5.280
1:75 000	1 inch	75 000 in	$\frac{63\ 360}{1} = \frac{75\ 000}{x}$	1.1837121	6	$\frac{1.1837121}{1} = \frac{6}{y}$	5.068
1:96 000	1 inch	96 000 in	$\frac{63\ 360}{1} = \frac{96\ 000}{x}$	1.5151515	7	$\frac{1.5151515}{1} = \frac{7}{y}$	4.620
1:100 000	1 inch	100 000 in	$\frac{63\ 360}{1} = \frac{100\ 000}{x}$	1.5782828	9	$\frac{1.5782828}{1} = \frac{9}{y}$	5.702
1:125 000	1 inch	125 000 in	$\frac{63\ 360}{1} = \frac{125\ 000}{x}$	1.9728535	12	$\frac{1.9728535}{1} = \frac{12}{y}$	6.082
1:150 000	1 inch	150 000 in	$\frac{63\ 360}{1} = \frac{150\ 000}{x}$	2.3674242	12	$\frac{2.3674242}{1} = \frac{12}{y}$	5.068

To find miles per inch on 1: 12 000 map . . .

63,360 inches = 1 mile
Show in ratio as ...
 $\frac{63\ 360}{1} \frac{\text{inches}}{\text{miles}}$

Let SCALE (12 000) be in inches
Fractional scale says 1 inch represents 12,000 in
Let x be miles that 1 inch represents on map
Show in ratio as ...
 $\frac{12\ 000}{x} \frac{\text{inches}}{\text{miles}}$

Solution . . .

$$\frac{63\ 360}{1} = \frac{12\ 000}{x}$$

$$63\ 360 \cdot x = 12\ 000 \cdot 1$$

$$63\ 360 x = 12\ 000$$

$$\frac{63\ 360 x}{63\ 360} = \frac{12\ 000}{63\ 360}$$

$$x = \frac{12\ 000}{63\ 360} \text{ (SCALE)}$$

$$x = 0.1893939$$

35—BAR SCALES (continued)

BAR SCALE CALCULATIONS — MILES (1 mile = 63,360 inches)—continued							
FRACTIONAL SCALE	SCALE TO MAP REPRESENTATION		TO FIND MILES PER INCH (x in ratio)	MILES PER INCH	TOTAL MILES ON SCALE	TO FIND TOTAL SCALE LENGTH IN INCHES (y in ratio)	TOTAL SCALE LENGTH (INCHES)
	Scale Unit	represents Map Unit	Use ratio below or $\frac{\text{SCALE}}{63\,360}$			Use ratio below or $\frac{\text{Miles on scale}}{\text{Miles per inch}}$	
1:250 000	1inch	250 000 in	$\frac{63\,360}{1} = \frac{250\,000}{x}$	3.945707	25	$\frac{3.945707}{1} = \frac{25}{y}$	6.336
1:400 000	1inch	400 000 in	$\frac{63\,360}{1} = \frac{400\,000}{x}$	6.3131313	40	$\frac{6.3131313}{1} = \frac{40}{y}$	6.336
1:500 000	1inch	500 000 in	$\frac{63\,360}{1} = \frac{500\,000}{x}$	7.8914141	50	$\frac{7.8914141}{1} = \frac{50}{y}$	6.336
1:750 000	1inch	750 000 in	$\frac{63\,360}{1} = \frac{750\,000}{x}$	11.837121	60	$\frac{11.837121}{1} = \frac{60}{y}$	5.068
1:1 000 000	1inch	1 000 000 in	$\frac{63\,360}{1} = \frac{1\,000\,000}{x}$	15.782828	125	$\frac{15.782828}{1} = \frac{125}{y}$	7.920
1:2 000 000	1inch	2 000 000 in	$\frac{63\,360}{1} = \frac{2\,000\,000}{x}$	31.565656	250	$\frac{31.565656}{1} = \frac{250}{y}$	7.920
1:2 500 000	1inch	2 500 000 in	$\frac{63\,360}{1} = \frac{2\,500\,000}{x}$	39.45707	300	$\frac{39.45707}{1} = \frac{300}{y}$	7.603
1:5 000 000	1inch	5 000 000 in	$\frac{63\,360}{1} = \frac{5\,000\,000}{x}$	78.914141	600	$\frac{78.914141}{1} = \frac{600}{y}$	7.603
1:7 500 000	1inch	7 500 000 in	$\frac{63\,360}{1} = \frac{7\,500\,000}{x}$	118.37121	600	$\frac{118.37121}{1} = \frac{600}{y}$	5.068
1:10 000 000	1inch	10 000 000 in	$\frac{63\,360}{1} = \frac{10\,000\,000}{x}$	157.82828	1100	$\frac{157.82828}{1} = \frac{1100}{y}$	6.969

<p>To find miles per inch on 1: 250 000 map . . .</p> <p>63,360 inches = 1 mile Show in ratio as ...</p> $\frac{63\,360}{1} \frac{\text{inches}}{\text{miles}}$	<p>Let SCALE (250 000) be in inches Fractional scale says 1 inch represents 250,000 in Let x be miles that 1 inch represents on map Show in ratio as ...</p> $\frac{250\,000}{x} \frac{\text{inches}}{\text{miles}}$	<p>Solution . . .</p> $\frac{63\,360}{1} = \frac{250\,000}{x}$	<p>$63\,360 \cdot x = 250\,000 \cdot 1$ $63\,360 x = 250\,000$ $\frac{63\,360 x}{63\,360} = \frac{250\,000}{63\,360}$ $x = \frac{250\,000}{63\,360}$ (SCALE) $x = 3.945707$</p>
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35—BAR SCALES (continued)

BAR SCALE CALCULATIONS — FEET (1 foot = 12 inches)							
FRACTIONAL SCALE	SCALE TO MAP REPRESENTATION		TO FIND FEET PER INCH (x in ratio) Use ratio below or $\frac{\text{SCALE}}{12}$	FEET PER INCH	TOTAL FEET ON SCALE	TO FIND TOTAL SCALE LENGTH IN INCHES (y in ratio) Use ratio below or $\frac{\text{Feet on scale}}{\text{Feet per inch}}$	TOTAL SCALE LENGTH (INCHES)
	Scale Unit :	represents Map Unit					
1:12 000	1inch	12 000 in	$\frac{12}{1} = \frac{12\ 000}{x}$	1000.000	6000	$\frac{1000.000}{1} = \frac{6000}{y}$	6.000
1:20 000	1inch	20 000 in	$\frac{12}{1} = \frac{20\ 000}{x}$	1666.6666	8000	$\frac{1666.6666}{1} = \frac{8000}{y}$	4.800
1:24 000	1inch	24 000 in	$\frac{12}{1} = \frac{24\ 000}{x}$	2000.000	8000	$\frac{2000.000}{1} = \frac{8000}{y}$	4.000
1:25 000	1inch	25 000 in	$\frac{12}{1} = \frac{25\ 000}{x}$	2083.3333	8000	$\frac{2083.3333}{1} = \frac{8000}{y}$	3.840
1:31 250	1inch	31 250 in	$\frac{12}{1} = \frac{31\ 250}{x}$	2604.1666	8000	$\frac{2604.1666}{1} = \frac{8000}{y}$	3.072
1:31 680	1inch	31 680 in	$\frac{12}{1} = \frac{31\ 680}{x}$	2640.000	8000	$\frac{2640.000}{1} = \frac{8000}{y}$	3.030
1:48 000	1inch	48 000 in	$\frac{12}{1} = \frac{48\ 000}{x}$	4000.000	24 000	$\frac{4000.000}{1} = \frac{24\ 000}{y}$	6.000
1:50 000	1inch	50 000 in	$\frac{12}{1} = \frac{50\ 000}{x}$	4166.6666	24 000	$\frac{4166.6666}{1} = \frac{24\ 000}{y}$	5.760
1:62 500	1inch	62 500 in	$\frac{12}{1} = \frac{62\ 500}{x}$	5208.3333	30 000	$\frac{5208.3333}{1} = \frac{30\ 000}{y}$	5.760
1:63 360	1inch	63 360 in	$\frac{12}{1} = \frac{63\ 360}{x}$	5280.000	30 000	$\frac{5280.000}{1} = \frac{30\ 000}{y}$	5.681
1:72 000	1inch	72 000 in	$\frac{12}{1} = \frac{72\ 000}{x}$	6000.000	30 000	$\frac{6000.000}{1} = \frac{30\ 000}{y}$	5.000
1:75 000	1inch	75 000 in	$\frac{12}{1} = \frac{75\ 000}{x}$	6250.000	30 000	$\frac{6250.000}{1} = \frac{30\ 000}{y}$	4.800
1:96 000	1inch	96 000 in	$\frac{12}{1} = \frac{96\ 000}{x}$	8000.000	33 000	$\frac{8000.000}{1} = \frac{33\ 000}{y}$	4.125

<p>To find feet per inch on 1: 12 000 map . . .</p> <p>12 inches = 1 foot Show in ratio as ...</p> $\frac{12}{1} \frac{\text{inches}}{\text{feet}}$	<p>Let SCALE (12 000) be in inches Fractional scale says 1 inch represents 12,000 inches Let x be feet that 1 inch represents on map Show in ratio as ...</p> $\frac{12\ 000}{x} \frac{\text{inches}}{\text{feet}}$	<p>Solution . . .</p> $\frac{12}{1} = \frac{12\ 000}{x}$	$12 \cdot x = 12\ 000 \cdot 1$ $12 x = 12\ 000$ $\frac{12 x}{12} = \frac{12\ 000}{12}$ $x = \frac{12\ 000}{12} \text{ (SCALE)}$ $x = 1000.00$
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35—BAR SCALES (continued)

BAR SCALE CALCULATIONS — KILOMETERS (1 kilometer = 100,000 centimeters)								
FRACTIONAL SCALE	SCALE TO MAP REPRESENTATION		TO FIND KILOMETERS PER CENTIMETER (CM) (x in ratio) SCALE	KILOMETERS PER CM	TOTAL KILOMETERS ON SCALE	TO FIND TOTAL SCALE LENGTH IN	TOTAL SCALE LENGTH IN	
	Scale Unit :	represents Map Unit	Use ratio below or 100 000			Use ratio below or Kilometers on scale Kilometers per cm	CENTI-METERS	MILLI-METERS
1:12 000	1cm	12 000 cm	$\frac{100\ 000}{1} = \frac{12\ 000}{x}$	0.120	1.5	$\frac{0.120}{1} = \frac{1.5}{y}$	12.500	125.00
1:20 000	1cm	20 000 cm	$\frac{100\ 000}{1} = \frac{20\ 000}{x}$	0.200	2	$\frac{0.200}{1} = \frac{2}{y}$	10.000	100.00
1:24 000	1cm	24 000 cm	$\frac{100\ 000}{1} = \frac{24\ 000}{x}$	0.240	2	$\frac{0.240}{1} = \frac{2}{y}$	8.333	83.33
1:25 000	1cm	25 000 cm	$\frac{100\ 000}{1} = \frac{25\ 000}{x}$	0.250	2	$\frac{0.250}{1} = \frac{2}{y}$	8.000	80.00
1:31 250	1cm	31 250 cm	$\frac{100\ 000}{1} = \frac{31\ 250}{x}$	0.3125	2	$\frac{0.3125}{1} = \frac{2}{y}$	6.400	64.00
1:31 680	1cm	31 680 cm	$\frac{100\ 000}{1} = \frac{31\ 680}{x}$	0.3168	2	$\frac{0.3168}{1} = \frac{2}{y}$	6.313	63.13
1:48 000	1cm	48 000 cm	$\frac{100\ 000}{1} = \frac{48\ 000}{x}$	0.480	6	$\frac{0.480}{1} = \frac{6}{y}$	12.500	125.00
1:50 000	1cm	50 000 cm	$\frac{100\ 000}{1} = \frac{50\ 000}{x}$	0.500	6	$\frac{0.500}{1} = \frac{6}{y}$	12.000	120.00
1:62 500	1cm	62 500 cm	$\frac{100\ 000}{1} = \frac{62\ 500}{x}$	0.625	8	$\frac{0.625}{1} = \frac{8}{y}$	12.800	128.00
1:63 360	1cm	63 360 cm	$\frac{100\ 000}{1} = \frac{63\ 360}{x}$	0.6336	8	$\frac{0.6336}{1} = \frac{8}{y}$	12.626	126.26
1:72 000	1cm	72 000 cm	$\frac{100\ 000}{1} = \frac{72\ 000}{x}$	0.720	8	$\frac{0.720}{1} = \frac{8}{y}$	11.111	111.11
1:75 000	1cm	75 000 cm	$\frac{100\ 000}{1} = \frac{75\ 000}{x}$	0.750	8	$\frac{0.750}{1} = \frac{8}{y}$	10.666	106.66
1:96 000	1cm	96 000 cm	$\frac{100\ 000}{1} = \frac{96\ 000}{x}$	0.960	9	$\frac{0.960}{1} = \frac{9}{y}$	9.375	93.75
1:100 000	1cm	100 000 cm	$\frac{100\ 000}{1} = \frac{100\ 000}{x}$	1.000	11	$\frac{1.000}{1} = \frac{11}{y}$	11.000	110.00
1:125 000	1cm	125 000 cm	$\frac{100\ 000}{1} = \frac{125\ 000}{x}$	1.250	12	$\frac{1.250}{1} = \frac{12}{y}$	9.600	96.00
1:150 000	1cm	150 000 cm	$\frac{100\ 000}{1} = \frac{150\ 000}{x}$	1.500	12	$\frac{1.500}{1} = \frac{12}{y}$	8.000	80.00

To find kilometers per centimeter on 1: 12 000 map . . .

100 000 centimeters = 1 kilometer
Show in ratio as ...

$$\frac{100\ 000}{1} \frac{\text{centimeters}}{\text{kilometers}}$$

Let SCALE (12 000) be in centimeters
Fractional scale says 1 centimeter represents
12,000 centimeters
Let x be kilometers that 1 cm represents on map
Show in ratio as ...

$$\frac{12\ 000}{x} \frac{\text{centimeters}}{\text{kilometers}}$$

Solution . . .

$$\frac{100\ 000}{1} = \frac{12\ 000}{x}$$

$$100\ 000 \cdot x = 12\ 000 \cdot 1$$

$$100\ 000 x = 12\ 000$$

$$\frac{100\ 000 x}{100\ 000} = \frac{12\ 000}{100\ 000}$$

$$x = \frac{12\ 000}{100\ 000}$$

$$x = 0.120 \text{ (SCALE)}$$

$$x = 0.120$$

35—BAR SCALES (continued)

BAR SCALE CALCULATIONS — KILOMETERS (1 kilometer = 100,000 centimeters)—continued								
FRACTIONAL SCALE	SCALE TO MAP REPRESENTATION		TO FIND KILOMETERS PER CENTIMETER (CM) (x in ratio) $\frac{\text{SCALE}}{100\,000}$ Use ratio below or 100 000	KILOMETERS PER CM	TOTAL KILOMETERS ON SCALE	TO FIND TOTAL SCALE LENGTH IN CENTIMETERS (y in ratio) Use ratio below or Kilometers on scale Kilometers per cm	TOTAL SCALE LENGTH IN	
	Scale Unit	represents Map Unit					CENTI-METERS	MILLI-METERS
1:250 000	1cm	250 000 cm	$\frac{100\,000}{1} = \frac{250\,000}{x}$	2.500	30	$\frac{2.500}{1} = \frac{30}{y}$	12.000	120.00
1:400 000	1cm	400 000 cm	$\frac{100\,000}{1} = \frac{400\,000}{x}$	4.000	60	$\frac{4.000}{1} = \frac{60}{y}$	15.000	150.00
1:500 000	1cm	500 000 cm	$\frac{100\,000}{1} = \frac{500\,000}{x}$	5.000	60	$\frac{5.000}{1} = \frac{60}{y}$	12.000	120.00
1:750 000	1cm	750 000 cm	$\frac{100\,000}{1} = \frac{750\,000}{x}$	7.500	60	$\frac{7.500}{1} = \frac{60}{y}$	8.000	80.00
1:1 000 000	1cm	1 000 000 cm	$\frac{100\,000}{1} = \frac{1\,000\,000}{x}$	10.000	125	$\frac{10.000}{1} = \frac{125}{y}$	12.500	125.00
1:2 000 000	1cm	2 000 000 cm	$\frac{100\,000}{1} = \frac{2\,000\,000}{x}$	20.000	300	$\frac{20.000}{1} = \frac{300}{y}$	15.000	150.00
1:2 500 000	1cm	2 500 000 cm	$\frac{100\,000}{1} = \frac{2\,500\,000}{x}$	25.000	400	$\frac{25.000}{1} = \frac{400}{y}$	16.000	160.00
1:5 000 000	1cm	5 000 000 cm	$\frac{100\,000}{1} = \frac{5\,000\,000}{x}$	50.000	800	$\frac{50.000}{1} = \frac{800}{y}$	16.000	160.00
1:7 500 000	1cm	7 500 000 cm	$\frac{100\,000}{1} = \frac{7\,500\,000}{x}$	75.000	800	$\frac{75.000}{1} = \frac{800}{y}$	10.666	106.66
1:10 000 000	1cm	10 000 000 cm	$\frac{100\,000}{1} = \frac{10\,000\,000}{x}$	100.000	1500	$\frac{100.000}{1} = \frac{1500}{y}$	15.000	150.00

To find kilometers per centimeter on 1: 250 000 map . . .

100 000 centimeters = 1 kilometer
Show in ratio as ...
 $\frac{100\,000}{1}$ centimeters
kilometers

Let SCALE (250 000) be in centimeters
Fractional scale says 1 centimeter represents 250,000 centimeters
Let x be kilometers that 1 cm represents on map
Show in ratio as ... $\frac{250\,000}{x}$ centimeters
kilometers

Solution . . .

$$\begin{aligned} 100\,000 \cdot x &= 250\,000 \cdot 1 \\ 100\,000 x &= 250\,000 \\ \frac{100\,000}{1} &= \frac{250\,000}{x} & \frac{100\,000 x}{100\,000} &= \frac{250\,000}{100\,000} \\ x &= \frac{250\,000}{100\,000} \text{ (SCALE)} \\ x &= 2.5 \end{aligned}$$