

Eserciziario sugli angoli. Esercizi completi di soluzione guidata.  
*How to operate with angle measure (Geometry).*

### Riduzione al secondo

Riduci in secondi le seguenti misure angolari.

1.	$7' 8''$	$12' 1''$
2.	$1' 12''$	$1^\circ 6' 15''$
3.	$1^\circ 3' 12''$	$12^\circ 16'$
4.	$3^\circ 32''$	$2^\circ 13' 1''$
5.	$35^\circ 37''$	$4^\circ 5' 51''$

### Riduzione al minuto

Riduci in minuti le seguenti misure angolari.

6.	$7^\circ$	$120^\circ$
7.	$17^\circ$	$180^\circ$
8.	$1^\circ 3'$	$12^\circ 16'$
9.	$30^\circ 45'$	$2^\circ 13'$
10.	$135^\circ 23'$	$90^\circ 55'$

### Riduzione in forma normale

Riduci in forma normale (con il valore dei secondi e dei minuti che non supera il 59) le seguenti misure angolari.

11.	$12^\circ 30' 70''$	$10^\circ 60' 12''$
12.	$80' 80''$	$12^\circ 130' 115''$
13.	$25^\circ 75' 72''$	$160^\circ 76'$
14.	$101^\circ 35' 212''$	$132^\circ 159' 181''$
15.	$123^\circ 285' 62''$	$272^\circ 279' 281''$

**Operazioni con le misure di angoli**

Esegui le seguenti addizioni e, se necessario, porta il risultato in forma normale.

- |     |   |  |
|-----|---|--|
| 16. | $1^{\circ} 30' 20'' + 5^{\circ} 10' 12''$     | $4^{\circ} 40' 10'' + 5^{\circ} 17''$        |
| 17. | $11^{\circ} 40'' + 30' 59''$                  | $100^{\circ} 10' 10'' + 21^{\circ} 45' 10''$ |
| 18. | $21^{\circ} 40' 40'' + 30' 44''$              | $3^{\circ} 56' 56'' + 101^{\circ} 6' 8''$    |
| 19. | $12^{\circ} 23' 30'' + 10^{\circ} 40' 28''$   | $12^{\circ} 56' 36'' + 34^{\circ} 50' 35''$  |
| 20. | $170^{\circ} 30' 25'' + 120^{\circ} 51' 57''$ | $90^{\circ} 54' 58'' + 80^{\circ} 58''$      |

Esegui le seguenti moltiplicazioni e, se necessario, porta il risultato in forma normale.

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|-----|------------------------------|-------------------------------|
| 21. | $6^{\circ} 30' \cdot 3$      | $85' 22'' \cdot 3$            |
| 22. | $1^{\circ} 23' 40'' \cdot 5$ | $14^{\circ} 45' 32'' \cdot 4$ |
| 23. | $3^{\circ} 23' 23'' \cdot 2$ | $2^{\circ} 5' 25'' \cdot 10$  |
| 24. | $7^{\circ} 45' 5'' \cdot 7$  | $60^{\circ} 15' 33'' \cdot 2$ |
| 25. | $1^{\circ} 12' 13'' \cdot 4$ | $25^{\circ} 25' 10'' \cdot 8$ |

Esegui le seguenti sottrazioni e, se necessario, porta il risultato in forma normale.

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|-----|--|---|
| 26. | $16^{\circ} 40' 20'' - 2^{\circ} 20' 19''$   | $204^{\circ} 45' 12'' - 14^{\circ} 12''$      |
| 27. | $62^{\circ} 30' 10'' - 2^{\circ} 12' 20''$   | $12^{\circ} 5' 12'' - 6' 12''$                |
| 28. | $307^{\circ} 13' 45'' - 2^{\circ} 12' 48''$  | $14^{\circ} 13' 57'' - 11^{\circ} 13' 58''$   |
| 29. | $106^{\circ} 50' 10'' - 29^{\circ} 20' 59''$ | $203^{\circ} 5' 52'' - 101^{\circ} 40'$       |
| 30. | $90^{\circ} 42' 19'' - 45^{\circ} 45' 29''$  | $300^{\circ} 15' 22'' - 100^{\circ} 45' 42''$ |

Esegui le seguenti divisioni e, se necessario, porta il risultato in forma normale.

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|-----|--------------------------|--------------------------|
| 31. | $66^{\circ} 40' : 4$     | $55' 27'' : 3$           |
| 32. | $1^{\circ} 33' 15'' : 3$ | $4^{\circ} 45' 4'' : 2$  |
| 33. | $32' 15'' : 5$           | $7' 30'' : 10$           |
| 34. | $2^{\circ} 16'' : 2$     | $6^{\circ} 17' 24'' : 4$ |
| 35. | $1' 3'' : 3$             | $5^{\circ} 27' 15'' : 5$ |

Calcola il complementare ( $\alpha + \beta = 90^{\circ}$ ) di ciascuno dei seguenti angoli.

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|-----|--------------|--------------|
| 36. | $32^{\circ}$ | $54^{\circ}$ |
|-----|--------------|--------------|

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37.	$45^{\circ} 45'$	$60^{\circ} 55'$
38.	$5^{\circ} 59' 32''$	$88^{\circ} 30' 30''$
39.	$75^{\circ} 42' 44''$	$70^{\circ} 20' 10''$
40.	$80^{\circ} 50' 40''$	$70^{\circ} 40' 29''$

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Calcola il supplementare ( $\alpha + \beta = 180^{\circ}$ ) di ciascuno dei seguenti angoli.

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41.	$132^{\circ}$	$35^{\circ}$
42.	$50^{\circ}$	$145^{\circ}$
43.	$145^{\circ} 40'$	$30^{\circ} 50'$
44.	$160^{\circ} 50' 32''$	$80^{\circ} 20' 10''$
45.	$175^{\circ} 22' 33''$	$100^{\circ} 40' 30''$
46.	$90^{\circ} 30''$	$90^{\circ} 30' 30''$

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Calcola l'esplementare ( $\alpha + \beta + \gamma = 360^{\circ}$ ) di ciascuno dei seguenti angoli.

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47.	$300^{\circ}$	$270^{\circ}$
48.	$50^{\circ}$	$45^{\circ}$
49.	$250^{\circ} 30'$	$30^{\circ} 20'$
50.	$160^{\circ} 10'$	$80^{\circ} 50'$
51.	$175^{\circ} 20' 30''$	$180^{\circ} 40' 30''$
52.	$90^{\circ} 30''$	$90^{\circ} 30'$

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## Soluzioni

## Riduzione al secondo

$7' 8''$	$7 \times 60 + 8 = 420 + 8 = \mathbf{428''}$
$12' 1''$	$12 \times 60 + 8 = 720 + 1 = \mathbf{721''}$
$1' 12''$	$1 \times 60 + 12 = 60 + 12 = \mathbf{72''}$
$1^\circ 6' 15''$	$1 \times 3600 + 6 \times 60 + 15 = 3600 + 360 + 15 = \mathbf{3.975''}$
$1^\circ 3' 12''$	$1 \times 3600 + 3 \times 60 + 12 = 3600 + 180 + 12 = \mathbf{3.792''}$
$12^\circ 16'$	$12 \times 3600 + 16 \times 60 = 43200 + 960 = \mathbf{44.160''}$
$3^\circ 32''$	$3 \times 3600 + 32 = 10800 + 32 = \mathbf{10.832''}$
$2^\circ 13' 1''$	$2 \times 3600 + 13 \times 60 + 1 = 7200 + 780 + 1 = \mathbf{7.981''}$
$35^\circ 37''$	$35 \times 3600 + 37 = 126000 + 37 = \mathbf{126.037''}$
$4^\circ 5' 51''$	$4 \times 3600 + 5 \times 60 + 51 = 14400 + 300 + 51 = \mathbf{14.751''}$

## Riduzione al primo

$7^\circ$	$7 \times 60 = \mathbf{420'}$
$120^\circ$	$120 \times 60 = \mathbf{7.200'}$
$17^\circ$	$17 \times 60 = \mathbf{1.020'}$
$180^\circ$	$180 \times 60 = \mathbf{10.800'}$
$1^\circ 3'$	$1 \times 60 + 3 = 60 + 3 = \mathbf{63'}$
$12^\circ 16'$	$12 \times 60 + 16 = 720 + 16 = \mathbf{736'}$
$30^\circ 45'$	$30 \times 60 + 45 = 1800 + 45 = \mathbf{1.845'}$
$2^\circ 13'$	$2 \times 60 + 13 = 120 + 13 = \mathbf{133'}$
$135^\circ 23'$	$135 \times 60 + 23 = 8100 + 23 = \mathbf{8.123'}$
$90^\circ 55'$	$90 \times 60 + 55 = 5400 + 55 = \mathbf{5.455'}$

**Riduzione in forma normale**

12° 30' 70"	$  \begin{array}{r}  12^\circ 30' 70'' \\  \underline{1' 10''} \\  \mathbf{12^\circ 31' 10''}  \end{array}  $
10° 60' 12"	$  \begin{array}{r}  10^\circ 60' 12'' \\  \underline{1^\circ 0'} \\  \mathbf{11^\circ 0' 12''}  \end{array}  $
80' 80"	$  \begin{array}{r}  0^\circ 80' 80'' \\  \underline{1' 20''} \\  81' 20'' \\  \underline{1^\circ 21'} \\  \mathbf{1^\circ 21' 20''}  \end{array}  $
12° 130' 115"	$  \begin{array}{r}  12^\circ 130' 115'' \\  \underline{1' 55''} \\  131' 55'' \\  \underline{2^\circ 11'} \\  \mathbf{14^\circ 11' 55''}  \end{array}  $
25° 75' 72"	$  \begin{array}{r}  25^\circ 75' 72'' \\  \underline{1' 12''} \\  76' 12'' \\  \underline{1^\circ 16'} \\  \mathbf{26^\circ 16' 12''}  \end{array}  $
160° 76'	$  \begin{array}{r}  160^\circ 76' \\  \underline{1^\circ 16'} \\  \mathbf{161^\circ 16'}  \end{array}  $
101° 35' 212"	$  \begin{array}{r}  101^\circ 35' 212'' \\  \underline{3' 32''} \\  \mathbf{101^\circ 38' 32''}  \end{array}  $
132° 159' 181"	$  \begin{array}{r}  132^\circ 159' 181'' \\  \underline{3' 1''} \\  162' 1'' \\  \underline{2^\circ 42'} \\  \mathbf{134^\circ 42' 12''}  \end{array}  $
123° 285' 62"	$  \begin{array}{r}  123^\circ 285' 62'' \\  \underline{1' 2''} \\  286' 2'' \\  \underline{4^\circ 46'} \\  \mathbf{127^\circ 46' 2''}  \end{array}  $
272° 279' 281"	$  \begin{array}{r}  272^\circ 279' 281'' \\  \underline{4' 41''} \\  283' 41'' \\  \underline{4^\circ 43'} \\  \mathbf{276^\circ 43' 41''}  \end{array}  $

**Operazioni di addizione**

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$1^{\circ} 30' 20'' + 5^{\circ} 10' 12''$	$6^{\circ} 40' 32''$
$4^{\circ} 40' 10'' + 5^{\circ} 17''$	$16^{\circ} 40' 27''$
$11^{\circ} 40'' + 30' 59''$	$11^{\circ} 30' 99'' = 11^{\circ} 31' 39''$
$100^{\circ} 10' 10'' + 21^{\circ} 45' 10''$	$121^{\circ} 55' 20''$
$21^{\circ} 40' 40'' + 30' 44''$	$21^{\circ} 70' 84'' = 22^{\circ} 11' 24''$
$3^{\circ} 56' 56'' + 101^{\circ} 6' 8''$	$105^{\circ} 62' 64'' = 106^{\circ} 3' 4''$
$12^{\circ} 23' 30'' + 10^{\circ} 40' 28''$	$22^{\circ} 63' 58'' = 23^{\circ} 3' 58''$
$12^{\circ} 56' 36'' + 34^{\circ} 50' 35''$	$46^{\circ} 106' 71'' = 47^{\circ} 47' 11''$
$170^{\circ} 30' 25'' + 120^{\circ} 51' 57''$	$290^{\circ} 81' 82'' = 291^{\circ} 22' 22''$
$90^{\circ} 54' 58'' + 80^{\circ} 58''$	$170^{\circ} 54' 116'' = 170^{\circ} 55' 56''$

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**Operazioni di moltiplicazione**

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$6^h 30^m \cdot 3$	$18^\circ 90' = 19^\circ 30'$
$85' 22'' \cdot 3$	$255' 66'' = 4^\circ 16' 6''$
$1^\circ 23' 40'' \cdot 5$	$5^\circ 115' 200'' = 6^\circ 58' 20''$
$14^\circ 45' 32'' \cdot 4$	$56^\circ 180' 128'' = 59^\circ 2' 8''$
$3^\circ 23' 23'' \cdot 2$	$12^\circ 92' 92'' = 13^\circ 33' 32''$
$2^\circ 5' 25'' \cdot 10$	$20^\circ 50' 250'' = 20^\circ 54' 10''$
$7^\circ 45' 5'' \cdot 7$	$49^\circ 315' 35'' = 54^\circ 15' 35''$
$60^\circ 15' 33'' \cdot 2$	$120^\circ 30' 66'' = 120^\circ 31' 6''$
$1^\circ 12' 13'' \cdot 4$	$4^\circ 48' 92'' = 4^\circ 49' 32''$
$25^\circ 25' 10'' \cdot 8$	$200^\circ 200' 80'' = 203^\circ 21' 20''$

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**Operazioni di sottrazione**

$16^{\circ} 40' 20'' - 2^{\circ} 20' 19''$	$14^{\circ} 20' 1''$
$204^{\circ} 45' 12'' - 14^{\circ} 12''$	$190^{\circ} 45'$
$62^{\circ} 30' 10'' - 2^{\circ} 12' 20''$	$62^{\circ} 30' 10'' - 2^{\circ} 12' 20'' =$ $62^{\circ} 29' 70'' - 2^{\circ} 12' 20'' =$ $60^{\circ} 17' 50''$
$12^{\circ} 5' 12'' - 6' 12''$	$12^{\circ} 5' 12'' - 6' 12'' =$ $11^{\circ} 65' 12'' - 6' 12'' =$ $11^{\circ} 59'$
$307^{\circ} 13' 45'' - 2^{\circ} 12' 48''$	$307^{\circ} 13' 45'' - 2^{\circ} 12' 48'' =$ $307^{\circ} 12' 105'' - 2^{\circ} 12' 48'' =$ $305^{\circ} 57''$
$14^{\circ} 13' 57'' - 11^{\circ} 13' 58''$	$14^{\circ} 13' 57'' - 11^{\circ} 13' 58'' =$ $13^{\circ} 72' 117'' - 11^{\circ} 13' 58'' =$ $2^{\circ} 59' 59''$
$106^{\circ} 50' 10'' - 29^{\circ} 20' 59''$	$106^{\circ} 50' 10'' - 29^{\circ} 20' 59'' =$ $106^{\circ} 49' 70'' - 29^{\circ} 20' 59'' =$ $77^{\circ} 29' 11''$
$203^{\circ} 5' 52'' - 101^{\circ} 40'$	$203^{\circ} 5' 52'' - 101^{\circ} 40' =$ $202^{\circ} 65' 52'' - 101^{\circ} 40' =$ $101^{\circ} 25' 52''$
$90^{\circ} 42' 19'' - 45^{\circ} 45' 29''$	$90^{\circ} 42' 19'' - 45^{\circ} 45' 29'' =$ $89^{\circ} 101' 79'' - 45^{\circ} 45' 29'' =$ $44^{\circ} 56' 50''$
$300^{\circ} 15' 22'' - 100^{\circ} 45' 42''$	$300^{\circ} 15' 22'' - 100^{\circ} 45' 42'' =$ $299^{\circ} 74' 82'' - 100^{\circ} 45' 42'' =$ $199^{\circ} 29' 40''$

**Operazioni di divisione**

$66^{\circ} 40' : 4$	$66^{\circ} 40' : 4 = 16^{\circ} 40'$ $\frac{2^{\circ}=120'}{160'}$
$55' 27'' : 3$	$55' 27'' : 3 = 18' 29''$ $\frac{1'=60''}{87''}$
$1^{\circ} 33' 15'' : 3$	$1^{\circ} 33' 15'' : 3 = 31' 5''$ $\frac{1^{\circ}=60'}{93'}$
$4^{\circ} 45' 4'' : 2$	$4^{\circ} 45' 4'' : 2 = 2^{\circ} 22' 32''$ $\frac{1'=60''}{64''}$
$32' 15'' : 5$	$32' 15'' : 5 = 6' 27''$ $\frac{2'=120''}{135''}$
$7' 30'' : 10$	$7' 30'' : 10 = 45''$ $\frac{7'=420''}{450''}$
$2^{\circ} 16'' : 2$	$2^{\circ} 16'' : 2 = 1' 8''$
$6^{\circ} 17' 24'' : 4$	$6^{\circ} 17' 24'' : 4 = 1^{\circ} 34' 21''$ $\frac{1'=60''}{84''}$
$1' 3'' : 3$	$1' 3'' : 3 = 21''$ $\frac{1'=60''}{63''}$
$5^{\circ} 27' 15'' : 5$	$5^{\circ} 27' 15'' : 5 = 1^{\circ} 5' 27''$ $\frac{2'=120''}{135''}$

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Calcola il complementare ( $\alpha + \beta = 90^\circ$ ) di ciascuno dei seguenti angoli.

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$32^\circ$	$90^\circ - 32^\circ = \mathbf{58^\circ}$
$54^\circ$	$90^\circ - 54^\circ = \mathbf{36^\circ}$
$45^\circ 45'$	$90^\circ - 45^\circ 45' =$ $89^\circ 60' - 45^\circ 45' = \mathbf{44^\circ 15'}$
$60^\circ 55'$	$90^\circ - 60^\circ 55' =$ $89^\circ 60' - 60^\circ 55' = \mathbf{29^\circ 5'}$
$5^\circ 59' 32''$	$90^\circ - 5^\circ 59' 32'' =$ $89^\circ 59' 60'' - 5^\circ 59' 32'' =$ $\mathbf{84^\circ 28''}$
$88^\circ 30' 30''$	$90^\circ - 88^\circ 30' 30'' =$ $89^\circ 59' 60'' - 88^\circ 30' 30'' =$ $\mathbf{1^\circ 29' 30''}$
$75^\circ 42' 44''$	$90^\circ - 75^\circ 42' 44'' =$ $89^\circ 59' 60'' - 75^\circ 42' 44'' =$ $\mathbf{14^\circ 17' 16''}$
$70^\circ 20' 10''$	$90^\circ - 70^\circ 20' 10'' =$ $89^\circ 59' 60'' - 70^\circ 20' 10'' =$ $\mathbf{19^\circ 39' 50''}$
$80^\circ 50' 40''$	$90^\circ - 80^\circ 50' 40'' =$ $89^\circ 59' 60'' - 80^\circ 50' 40'' =$ $\mathbf{9^\circ 9' 20''}$
$70^\circ 40' 29''$	$90^\circ - 70^\circ 40' 30'' =$ $89^\circ 59' 60'' - 70^\circ 40' 30'' =$ $\mathbf{19^\circ 19' 31''}$

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Calcola il supplementare ( $\alpha + \beta = 180^\circ$ ) di ciascuno dei seguenti angoli.

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132°	$180^\circ - 132^\circ = \mathbf{48^\circ}$
35°	$180^\circ - 35^\circ = \mathbf{145^\circ}$
50°	$180^\circ - 50^\circ = \mathbf{130^\circ}$
145°	$180^\circ - 145^\circ = \mathbf{35^\circ}$
145° 40'	$180^\circ - 145^\circ 40' =$ $179^\circ 60' - 145^\circ 40' = \mathbf{34^\circ 20'}$
30° 50'	$180^\circ - 30^\circ 50' =$ $179^\circ 60' - 30^\circ 50' = \mathbf{149^\circ 10'}$
160° 50' 32"	$180^\circ - 160^\circ 50' 32'' =$ $179^\circ 59' 60'' - 160^\circ 50' 32'' =$ $\mathbf{19^\circ 9' 28''}$
80° 20' 10"	$180^\circ - 80^\circ 20' 10'' =$ $179^\circ 59' 60'' - 80^\circ 20' 10'' =$ $\mathbf{99^\circ 39' 50''}$
175° 22' 33"	$180^\circ - 175^\circ 22' 23'' =$ $179^\circ 59' 60'' - 175^\circ 22' 23'' =$ $\mathbf{4^\circ 37' 37''}$
100° 40' 30"	$180^\circ - 100^\circ 40' 33'' =$ $179^\circ 59' 60'' - 100^\circ 40' 33'' =$ $\mathbf{79^\circ 19' 30''}$
90° 30"	$180^\circ - 90^\circ 30'' =$ $179^\circ 59' 60'' - 90^\circ 30'' =$ $\mathbf{89^\circ 59' 30''}$
90° 30' 30"	$180^\circ - 90^\circ 30' 30'' =$ $179^\circ 59' 60'' - 90^\circ 30' 30'' =$ $\mathbf{89^\circ 29' 30''}$

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Calcola l'esplementare ( $\alpha + \beta + \gamma = 360^\circ$ ) di ciascuno dei seguenti angoli.

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300°	$360^\circ - 300^\circ = \mathbf{60^\circ}$
270°	$360^\circ - 270^\circ = \mathbf{90^\circ}$
50°	$360^\circ - 50^\circ = \mathbf{310^\circ}$
45°	$360^\circ - 45^\circ = \mathbf{315^\circ}$
250° 30'	$360^\circ - 230^\circ 30' =$ $359^\circ 60' - 250^\circ 30' = \mathbf{109^\circ 30'}$
30° 20'	$360^\circ - 30^\circ 20' =$ $359^\circ 60' - 30^\circ 20' = \mathbf{329^\circ 40'}$
160° 10'	$360^\circ - 160^\circ 10' =$ $359^\circ 60' - 160^\circ 10' = \mathbf{199^\circ 50'}$
80° 50'	$360^\circ - 80^\circ 50' =$ $359^\circ 60' - 80^\circ 50' = \mathbf{279^\circ 10'}$
175° 20' 30"	$360^\circ - 175^\circ 20' 30'' =$ $359^\circ 59' 60'' - 175^\circ 20' 30'' =$ $\mathbf{184^\circ 39' 30''}$
180° 40' 30"	$360^\circ - 180^\circ 40' 30'' =$ $359^\circ 59' 60'' - 180^\circ 40' 30'' =$ $\mathbf{179^\circ 19' 30''}$
90° 30"	$360^\circ - 90^\circ 30'' =$ $359^\circ 59' 60'' - 90^\circ 30'' =$ $\mathbf{269^\circ 59' 30''}$
90° 30'	$360^\circ - 90^\circ 30' =$ $359^\circ 60' - 90^\circ 30' =$ $\mathbf{269^\circ 30'}$

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