N5 Relationships Unit Revision

1. Make x the subject of each formula.

   a. $y = \dfrac{3}{x}$ b. $d = \dfrac{c}{x}$ c. $m = \dfrac{y}{x}$
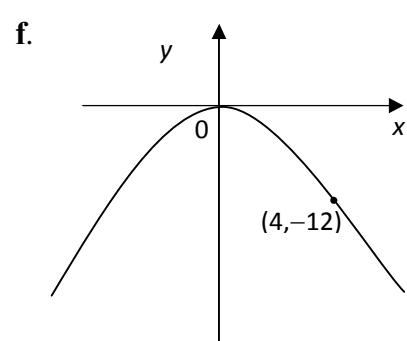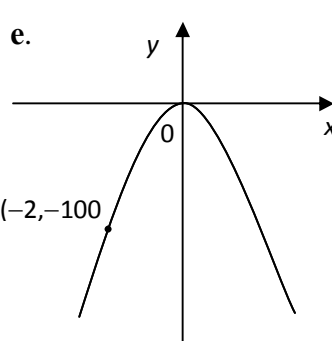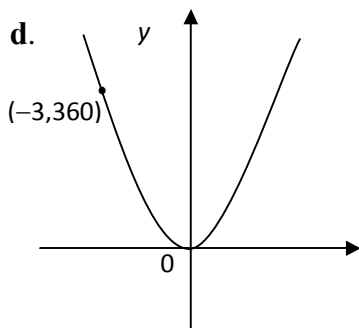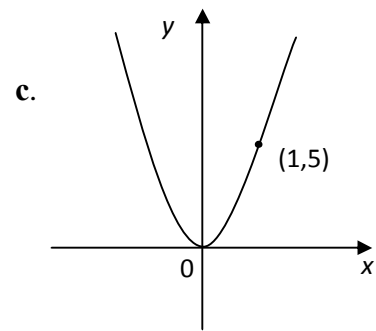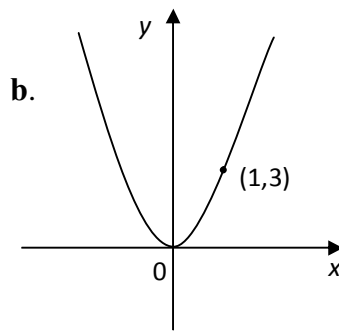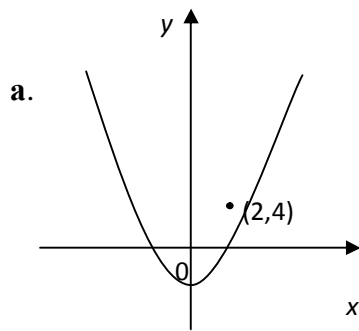
   d. $s = \dfrac{a+2}{x}$ e. $w = \dfrac{z-1}{x}$ f. $a = \dfrac{b+c}{x}$

2. Write down the equation of the graphs shown below, which have the form $y = ax^2$.
   (Diagrams are not drawn to scale)

a.

(2,4)

b.

(1,3)

c.

(1,5)

d.

(−3,360)

e.

(−2,−100)

f.

(4,−12)

3. Use the discriminant to determine the type of roots of each equation
   a. $2x^2 + 12x + 18 = 0$ b. $x^2 + 5x + 7 = 0$ c. $x^2 + 7x + 3 = 0$
   d. $x^2 + 8x + 16 = 0$ e. $x^2 + 3x + 4 = 0$ f. $2x^2 + 7x + 6 = 0$

4. For each equation, draw a suitable sketch and find the roots.
   a. $x^2 - 4x = 0$ b. $x^2 + 6x = 0$ c. $x^2 + 6x + 9 = 0$
   d. $x^2 - 5x + 4 = 0$ e. $x^2 + x - 6 = 0$ f. $x^2 - x - 2 = 0$

5.   For each of the equations below, write down **i**. the turning point

ii. its nature

and   **iii**. the equation of the axis
of symmetry

a. $y = (x - 4)^2 + 1$ **b.** $y = (x - 2)^2 + 5$ **c.** $y = (x - 1)^2 + 7$

d. $y = (x - 2)^2 - 3$ **e.** $y = (x - 3)^2 - 4$ **f.** $y = (2 - x)^2 + 12$

6.   Solve these quadratic equations by factorising first.
   a. $x^2 + 4x + 3 = 0$ **b.** $y^2 + 6y + 5 = 0$ **c.** $a^2 + 5a - 14 = 0$
   d. $y^2 - 11y + 18 = 0$ **e.** $t^2 - 7t - 30 = 0$ **f.** $2p^2 + 11p + 5 = 0$

7.   Solve these equations using the quadratic formula.
   a. $3x^2 + 7x + 2 = 0$ **b.** $2x^2 - 7x + 3 = 0$ **c.** $2a^2 - a - 3 = 0$

8.   Find the equations of the lines specified as follows :

      (a)   Passing through the point P(2,-3) with gradient 4 .

      (b)   Passing through the points A(-1,1) and B(3,-1) .

      (c)   Passing through (4,-5) and *parallel* to the line with

             equation $3x + 2y = 8$.

9.   Sketch the graphs of lines with equations

            a. $y = -2x - 1$ **b.** $y = -3x + 2$

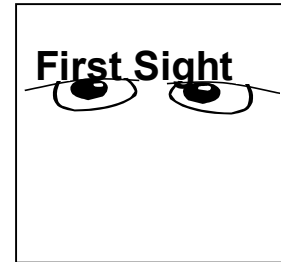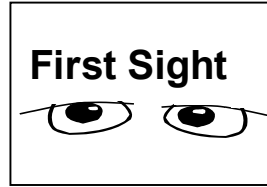10.   Solve each of the systems of equations below.
   a. $2x + y = 15$ **b.** $3x + 2y = 32$ **c.** $5x - 2y = 16$
            $x - y = 6$ $x - 2y = 8$ $3x + 4y = 20$

11.   Blear's new album is available at Your Cost record shops on CD and tape.

5 tapes and 4 CDs cost £97.

3 tapes and 3CDs cost £66
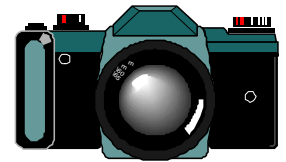
First Sight

First Sight

Calculate the cost of the tape and

of the CD.

12.   A photographer produces 2 sizes of print, Standard and Jumbo.

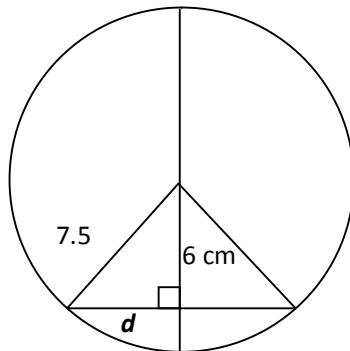A customer who orders 24 standard and 5 jumbo prints pays £7.79

Another customer pays £8.60 for 20 standard and 8 jumbo prints.

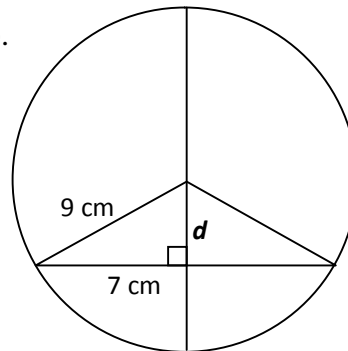How much would I have to pay for 1 standard and 1 jumbo print ?

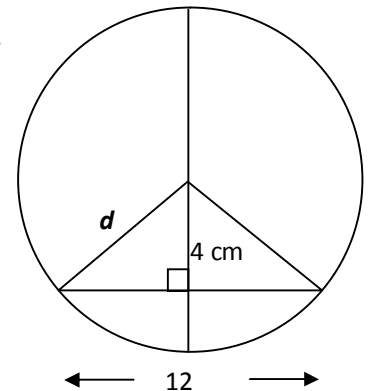13.   Calculate the length of *d* in each diagram.

a.
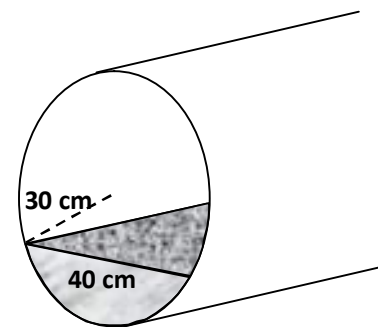
7.5

6 cm

d

b.

9 cm

d

7 cm

c.

d

4 cm

12

14.   A cylindrical pipe is used to transport water underground.
The radius of the pipe is 30 cm and the width of the water surface is 40 cm.

Calculate the height of the pipe above the water.

30 cm

40 cm

15.   Solve :

a. $6y + 3 = y + 18$ b. $5a + 7 = a + 15$

c. $5a - 9 = a + 15$ d. $10x + 1 = 4x + 19$

e. $5b + 3 = 2b + 9$ f. $10x - 1 = 4x + 5$

g. $5b - 3 = 2b + 9$ h. $3n - 10 = n + 2$

i. $7x - 14 = 3x + 2$ j. $6c - 13 = 3c + 59$

16.

Solve :

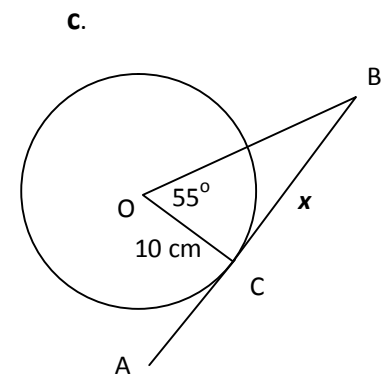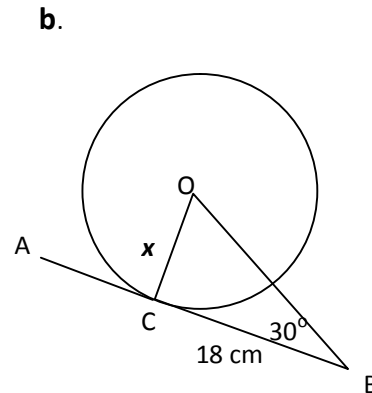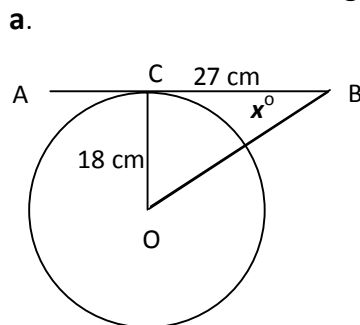a. $3x - 1 > 8$ b. $4x - 3 > 13$ c. $2x - 7 < 5$ d. $3x - 5 > 4$

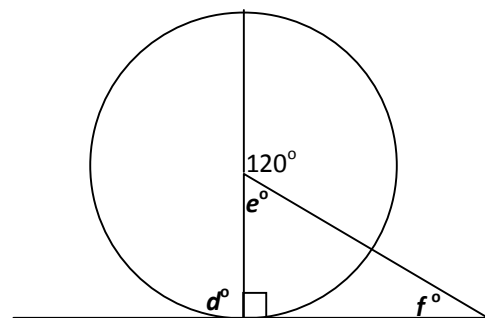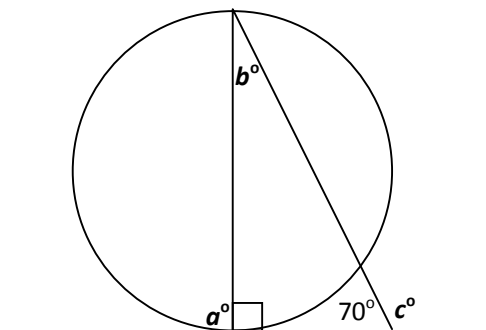e. $7a - 1 < 13$ f. $5y - 2 < 23$ g. $6p - 5 > 31$ h. $4c - 7 > 25$
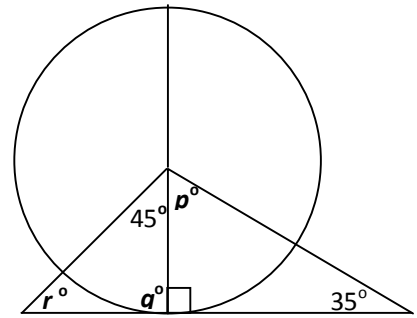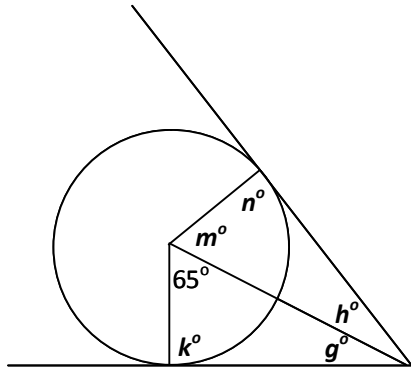
17.   In each of the diagrams below, AB is a tangent which touches the circle at C.

Calculate **x** for each diagram.

a.   b.   c.

18.   Calculate the sizes of the angles marked **a**, **b**, ...**r**, in the diagrams below.

19.   Solve the following equations where $0 \le x \le 360$
    a. $\sin x° = 0.313$ b. $\cos x° = 0.425$ c. $\tan x° = 5.145$
    d. $2 \cos x° = -1$ e. $2 \tan x° = -8$ f. $4 \sin x° = -3$
    g. $4 \cos x° - 3 = 0$ h. $3 \sin x° - 2 = 0$ i. $5 \cos x° + 2 = 0$
    j. $3 \cos x° + \sqrt{2} = 0$ k. $7 \sin x° - 1 = 4$ l. $2 \sin x° + \sqrt{3} = 2\sqrt{2}$

20.   Make sketches of the following functions, $0 \le x < 360$, clearly marking any important points.
    a. $y = \cos 3x°$ b. $y = 2 \sin 3x°$ c. $y = 4 \cos 3x°$
    d. $y = 3 \sin \frac{1}{2}x°$ e. $y = 5 \cos {}^{3}/_{2}\, x°$

21. The graphs represent trigonometric functions. Write down the equation for each.

a.

b.

c.

d.
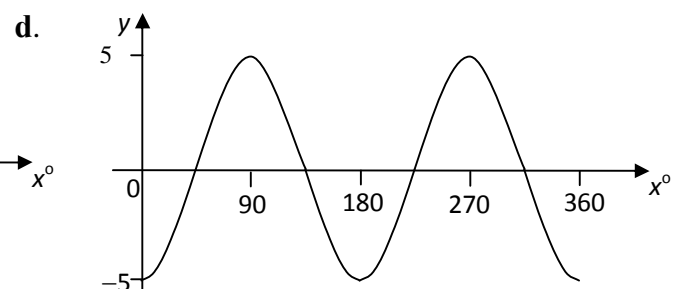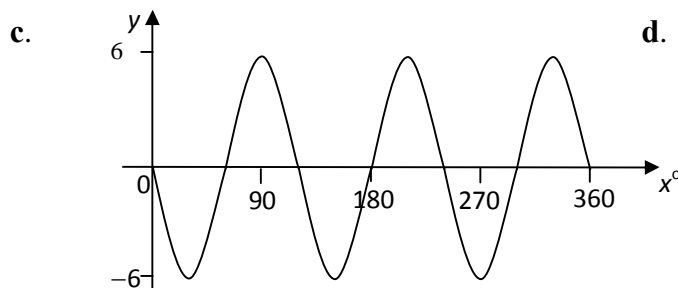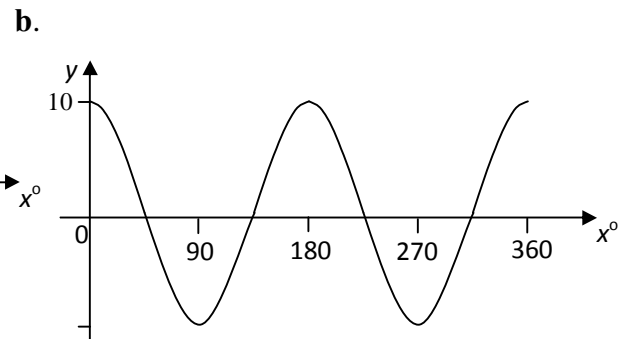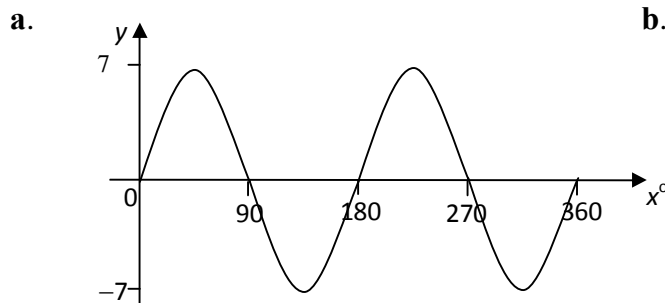
Answers

Q1. **a.** $x = \dfrac{3}{y}$ **b.** $x = \dfrac{c}{d}$ **c.** $x = \dfrac{y}{m}$ **d.** $x = \dfrac{a+2}{s}$

e. $x = \dfrac{z-1}{w}$ **f.** $x = \dfrac{b+c}{a}$

Q2. **a.** $y = x^2$ **b.** $y = 3x^2$ **c.** $y = 5x^2$

d. $y = 40x^2$ **e.** $y = -25x^2$ **f.** $y = -\tfrac{3}{4}x^2$

Q3. **a.** 0 (equal real) **b.** −3 (no real) **c.** 37 (distinct real) **d.** 0 (equal real)

e. -7 (no real) **f.** 1 (distinct real)

Q4. **a.** 0, 4 **b.** 0, −6 **c.** 0, 5

d. 1, 4 **e.** −3, 2 **f.** −1, 2

Q5. **a.** (4, 1) min, $x = 4$ **b.** (2, 5) min, $x = 2$ **c.** (1, 7) min, $x = 1$
d. (2, −3) min, $x = 2$ **e.** (3, −4) min, $x = 3$ **f.** (5, −2) min, $x = 5$

Q6. **a.** −3, −1 **b.** −5, −1 **c.** −7, 2 **d.** 1, 3½ **e.** − ½ , 1½ **f.** −5, − ½

Q7. **a.** −1.67, −1 **b.** 0.18, 0.70 **c.** −1.09, 0.76

Q8. **a.** $y = 4x - 11$ **b.** $x + 2y = 1$ **c.** $3x + 2y = 2$

Q9.
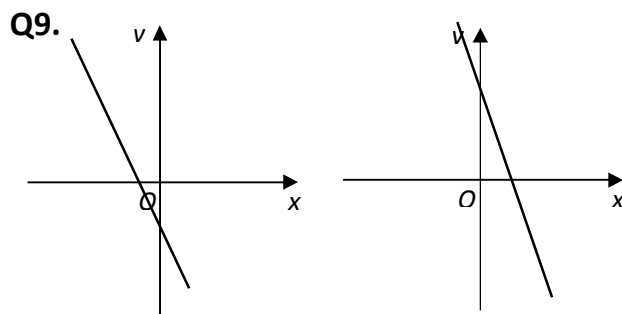
Q10. **a.** (7, 1) **b.** (10, 1) **j.** (½, 2)

Q11. tape £9, CD £13

Q12. 76p

Q13. **a.** 4.5 cm **b.** 5.7 cm **c.** 7.2 cm

Q14. 37.6 cm

Q15. **a.** $y = 3$ **b.** $a = 2$ **c.** $a = 6$ **d.** $x = 3$ **e.** $b = 2$

      f. $x = 1$ **g.** $b = 4$ **h.** $n = 6$ **i.** $x = 4$ **j.** $c = 24$

Q16. **a.** $x > 3$ **b.** $x > 4$ **c.** $x < 6$ **d.** $x > 3$ **e.** $a < 2$
    f. $y < 5$ **g.** $p > 6$ **h.** $c > 8$

Q17. **a.** 33.7^o **b.** 10.4 cm   **c.** 14.3 cm

Q18. **a.** 90° **b.** 20° **c.** 110° **d.** 90°

      e. 60° **f.** 30° **g.** 35° **h.** 35°

      k. 90° **m.** 65° **n.** 90° **p.** 55°

      q. 90° **r.** 45°

Q19. **a.** $18.2^o, 161.8^o$ **b.** $64.8^o, 295.2$ **c.** $79^o, 259^o$
    d. $120^o, 240^o$ **e.** $104^o, 284^o$ **f.** $228.6^o, 311.4^o$

     g. $41.4^o, 318.6^o$ **h.** $41.8^o, 138.2^o$ **i.** $113.6^o, 246.4^o$
     j. $61.9^o, 298.1^o$ **k.** $45.6^o, 134.4^o$ **l.** $60^o, 120^o$

Q20.

Q21.   **a.** $y = 7 \sin 2x^o$ **b.** $y = 10 \cos 2x^o$
        g. $y = -6 \sin 3x^o$ **h.** $y = -5 \cos 2x^o$