Perth Academy

Mathematics Department

Intermediate 2

Unit 1 – Revision Pack

Contents:

Significant Figures

Q1. Round to **1** significant figure :

a.	23	**b**.	5.5	**c**.	78	**d**.	31
e.	125	**f**.	309	**g**.	291	**h**.	843.6
i.	7646	**j**.	1928	**k**.	8003	**l**.	5192.7
m.	10.9	**n**.	556.2	**o**.	3.98	**p**.	12345
q.	1.01	**r**.	93	**s**.	0.86	**t**.	606

Q2. Round to **2** significant figures :

a.	8.72	**b**.	92.8	**c**.	0.186	**d**.	679
e.	2.112	**f**.	6.463	**g**.	31.4	**h**.	25.8
i.	24.27	**j**.	18.76	**k**.	6397	**l**.	4.99
m.	0.0526	**n**.	0.00613	**o**.	0.08702	**p**.	13814
q.	2.456	**r**.	45192	**s**.	29.302	**t**.	0.756

Q3. Round to **3** significant figures :

a.	49.32	**b**.	2.345	**c**.	0.5928	**d**.	4765
e.	6.081	**f**.	24180	**g**.	0.06281	**h**.	29.514
i.	0.0094682	**j**.	56248	**k**.	0.09803	**l**.	24.47
m.	28.32	**n**.	2463	**o**.	3174	**p**.	30.03
q.	2.6759	**r**.	3085	**s**.	2.007	**t**.	0.0003175

Q4. Round 248382 correct to

a. 4 sig. figs **b**. 3 sig. figs **c**. 2 sig. figs **d**. 1 sig. fig

Q5. Round 0.0286016 correct to

a. 4 sig. figs **b**. 3 sig. figs **c**. 2 sig. figs **d**. 1 sig. fig

Q6. Calculate and give your answer correct to **2** significant figures

a.	5.16×22.7	**b**.	$27.3 \div 6.84$	**c**.	3.14×9^2
d.	$25.8 \times 1.76 \div 1.1$	**e**.	13.2×3.72	**f**.	$25.8 \div 52.9$
g.	$1.14^2 \times 2.92$	**h**.	$5.2 \times 0.49 \div 30.3$	**i**.	$234 \div (0.028 \times 33)$
j.	$(0.08 \times 25^2) \div 3$	**k**.	$(1.05)^2 \times 455$	**l**.	$3.14 \times 12^2 \div 7$

Q7. Calculate and give your answer correct to 3 significant figures

a.	2.29×58.1	**b**.	$325.9 \div 68.2$	**c**.	3.14×18
d.	0.08×12349	**e**.	$3.7^2 \div 1.56$	**f**.	$1001 \div 3$
g.	$12.7 \times (1.24 + 0.321)$	**h**.	$0.13 \times 99 \div 0.49$	**i**.	$0.77 \div (4.2 \times 1.9)$
j.	$(26.9 - 1.85) \times 13$	**k**.	$60 \div 29$	**l**.	$11 \times 2.6 \div 30$

Percentages – appreciation & depreciation

Q1. For each of the investments below, calculate

(i) the amount due at the end of the term

(ii) the total interest

	Bank/ Building Society	Amount Invested (£)	Rate of interest (per year)	Number of Years
a	Hamilton Bank	2000	8 %	2
b	Allied Friendly	5000	6 %	3
c	Northern Hill	4800	7 %	2
d	Highland Bank	3500	7.5 %	3
e	Church National	1600	5.5 %	4
f	Southern Rock	1750	11 %	3
g	London Savings Bank	20 000	6%	3
h	Bath & Eastern	18 000	8.5%	2
i	Royal Bank of Britain	50 000	9%	3
j	Bingford & Bradley	400	4.8%	2

Q2. At the beginning of the year, Mr. Bradford borrows £5000 from the bank. The rate of compound interest is 8%. He agrees to pay back £108 per month.
Calculate how much he still owes at the end of the second year.

Q3. The Smiths buy a house for £60,000. If it appreciates in value at the rate of 9% per year, how much will it be worth in 5 years time ?

Q4. Amanda wins some money and decides to spend £200 on some jewelry. If it appreciates at the rate of 2% per year, how much will the jewelry be worth 3 years from now ?

Q5. In 1990 the world population was estimated to be 5300 million, and was increasing at the rate of 1.7% per annum.
What will the population be in the year 2000 ? (answer to 2 significant figures)

Q6. Peter buys a car for £3000. If it depreciates at the rate of 20% per annum, how much will he be able to sell it for in 3 years time ?

Q7. Brian buys a new car costing £12600. It depreciates in value by 30% in the first year and by 20% each year after that.
How much will he be able to trade it in for in 3 years time ?

Q8. Each year a factory's machinery depreciates by 25% of its value at the beginning of the year. The initial value of the machinery was £360 000.

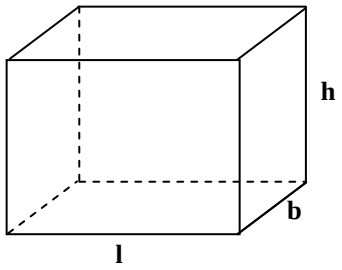
a. What was the value of the machinery after 1 year ?

b. The machinery was to be scrapped at the end of the year when its value fell below half its original value. After how many years should the machinery be scrapped ?

Volumes of Solids

Q1. **Rectangular - based prism (cuboid)**

Find the volume of a rectangular-based prism for the values of **l**, **b** and **h** given.

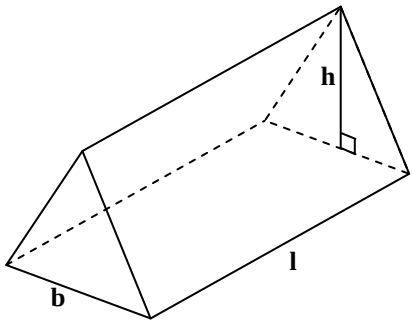


a.	l = 6 cm	b = 4 cm	h = 5 cm
b.	l = 8 cm	b = 3 cm	h = 6 cm
c.	l = 3 m	b = 1 m	h = 2 m
d.	l = 18 cm	b = 12 cm	h = 10 cm
e.	l = 7 cm	b = 7 cm	h = 7 cm
f.	l = 7.5 cm	b = 4 cm	h = 12 cm
g.	l = 8.3 cm	b = 2.7 cm	h = 10 cm
h.	l = 12.8cm	b = 6.5 cm	h = 4.3 cm
i.	l = 150 mm	b = 40 mm	h = 85 mm
j.	l = 14.5 cm	b = 14.5 cm	h = 34 cm

Q2. **Triangular - based prism**

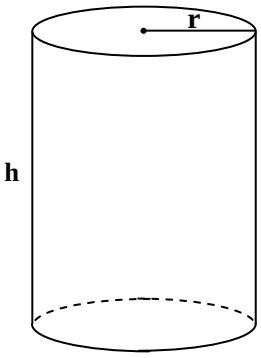
Find the volume of a rectangular-based prism for the values of **l**, **b** and **h** given.

a.	l = 6 cm	b = 4 cm	h = 3.5 cm
b.	l = 8 cm	b = 3 cm	h = 4 cm
c.	l = 9 cm	b = 6 cm	h = 5 cm
d.	l = 24 cm	b = 10 cm	h = 8 cm
e.	l = 16 cm	b = 11 cm	h = 6 cm
f.	l = 25 cm	b = 9 cm	h = 7 cm
g.	l = 14 cm	b = 4 cm	h = 8.5 cm
h.	l = 150 mm	b = 50 mm	h = 90 mm
i.	l = 18 cm	b = 4.5 cm	h = 12.4 cm
j.	l = 200 mm	b = 100 mm	h = 75 mm



Q3. **Circular – based prism (cylinder)**

Find the volume of a circular-based prism for the values of **r** and **h** given.

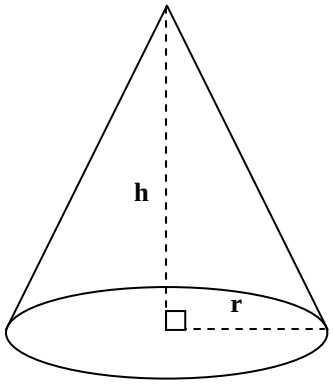


a.	r = 6 cm	h = 15 cm
b.	r = 8 cm	h = 24 cm
c.	r = 4 cm	h = 12 cm
d.	r = 10 cm	h = 8 cm
e.	r = 20 cm	h = 60 cm
f.	r = 7 cm	h = 20 cm
g.	r = 15 cm	h = 40 cm
h.	r = 11 cm	h = 35 cm
i.	r = 44 cm	h = 125 cm
j.	r = 8.8 cm	h = 30 cm

Q4. **Cone**

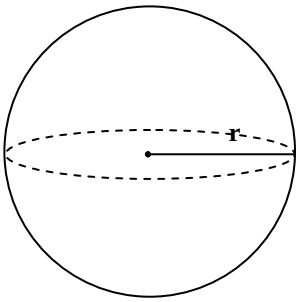
Find the volume of a cone for the following values of **r** and **h**.
(give your answers correct to 3 significant figures)

a.	r = 5 cm	h = 14 cm
b.	r = 7 cm	h = 25 cm
c.	r = 3 cm	h = 22 cm
d.	r = 12 cm	h = 7 cm
e.	r = 10 cm	h = 50 cm
f.	r = 8 cm	h = 20 cm
g.	r = 15 cm	h = 40 cm
h.	r = 11 cm	h = 37 cm
i.	r = 22 cm	h = 125 cm
j.	r = 8.8 cm	h = 30 cm



Q5. **Sphere**

Find the volume of a sphere for the following values of **r**.
(give your answers correct to 3 significant figures)



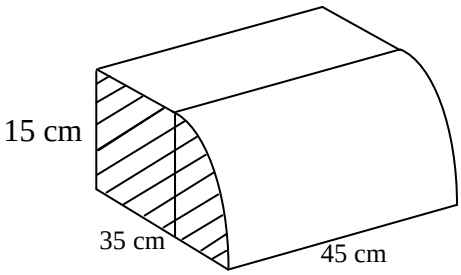
a.	r = 10 cm	**f**.	r = 18 cm
b.	r = 25 cm	**g**.	r = 80 mm
c.	r = 2 m	**h**.	r = 55 cm
d.	r = 200 mm	**i**.	r = 3.5 m
e.	r = 11 cm	**j**.	r = 48 cm

Q6. **Miscellaneous**

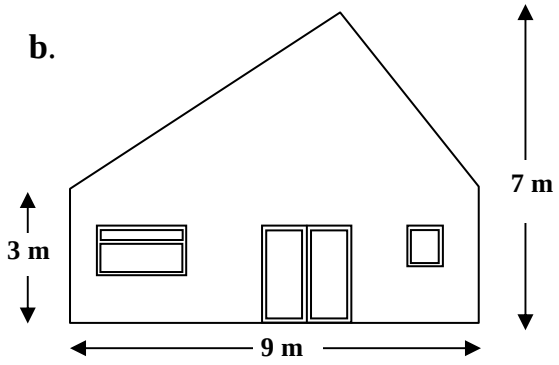
a. The diagram shows a bread- bin. The shaded side is made up from a rectangle and a quarter circle.

(i) Calculate the shaded area.

(ii) Calculate the volume.



b.

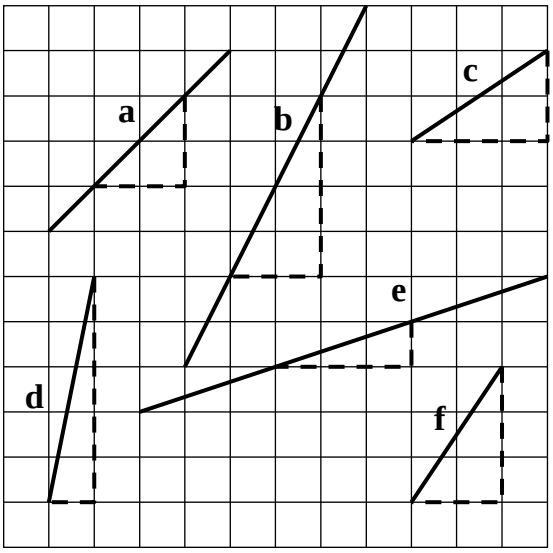


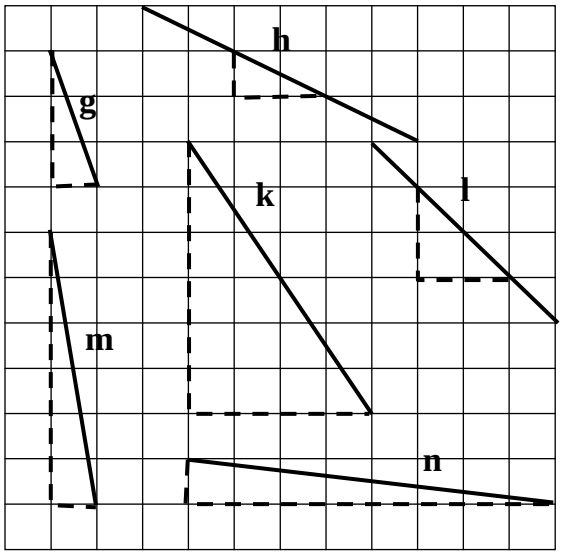
The diagram shows the side view of a house.

Find the volume of the house if its length is 12 metres.

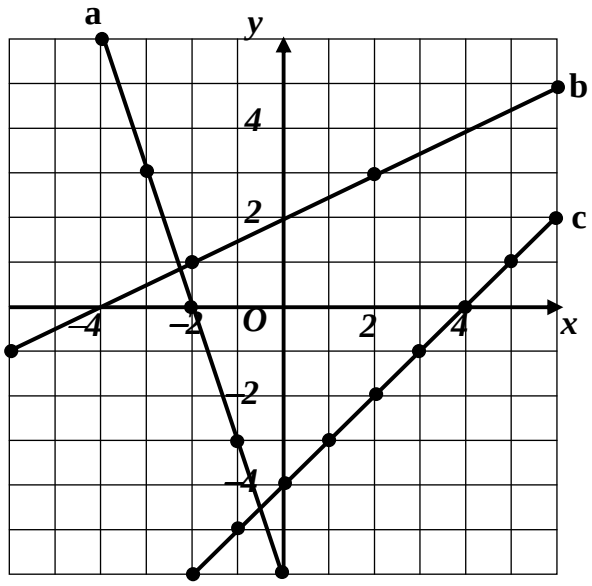
Linear Relationships ~ Gradients

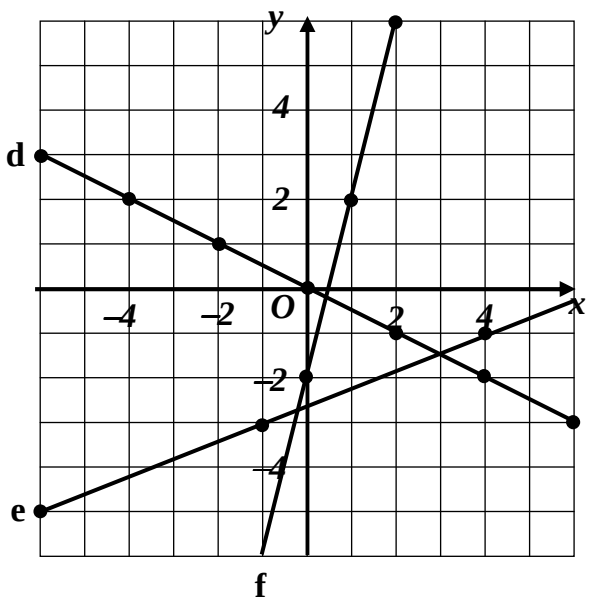
Q1. Find the **gradients** of the lines shown in each of the diagrams below





Q2. Find the **gradients** of the lines below





Q3. Plot the following pairs of points and calculate the gradient of the line joining them.

a. (2, 1) and (6, 3) **b**. (1, 5) and (3, 1) **c**. (2, 0) and (4, 6)

d. (–2, –3) and (2, 3) **e**. (–1, 2) and (5, –1) **f**. (–4, 2) and (4, –4)

g. (–6, –2) and (–5, 3) **h**. (4, –3) and (6, 5) **i**. (–2, 3) and (0, –2)

Linear Relationships ~ Straight Lines

Q1. For each line, write down the gradient and the coordinates of the point where it crosses the y – axis.

a. $y = 3x + 1$ **b**. $y = \frac{1}{2}x - 5$ **c**. $y = -2x + 3$

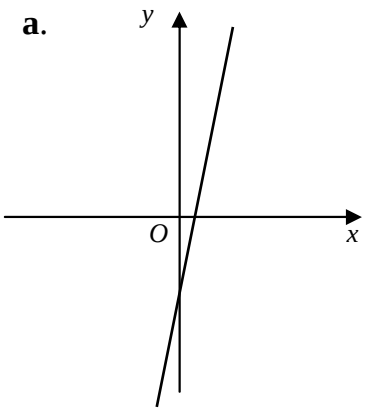
d. $y = -\frac{1}{4}x - 2$ **e**. $y = 8x - \frac{1}{2}$ **f**. $y = -x + 4$

Q2. Match these equations with the graphs shown below.

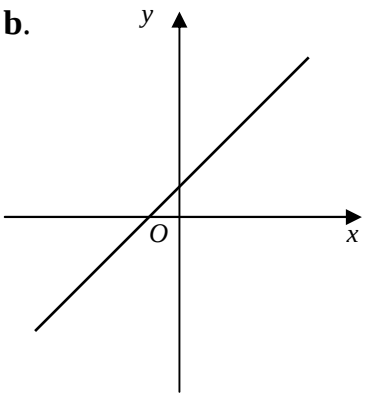
1. $y = x + 1$ **2**. $y = -2x - 3$ **3**. $y = \frac{1}{2}x + 4$

4. $y = -\frac{1}{4}x + 2$ **5**. $y = 6x - 2$ **6**. $y = 3x - 5$

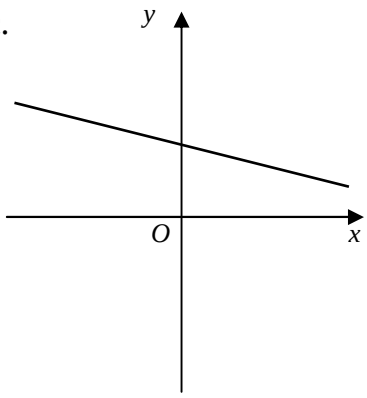
a.



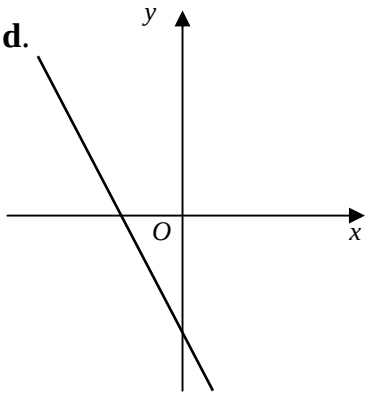
b.



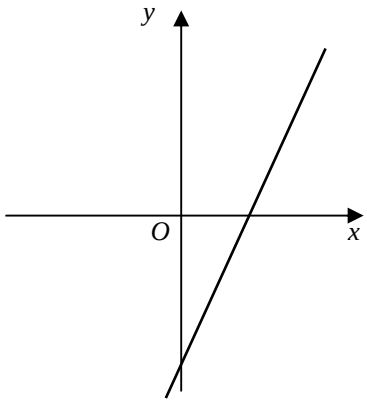
c.



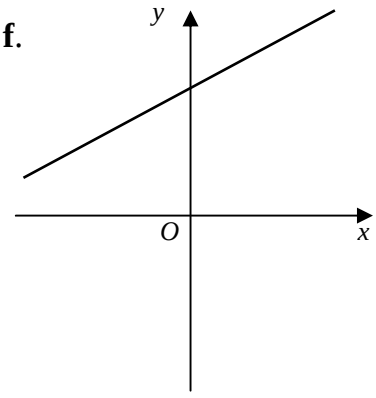
d.



e.



f.



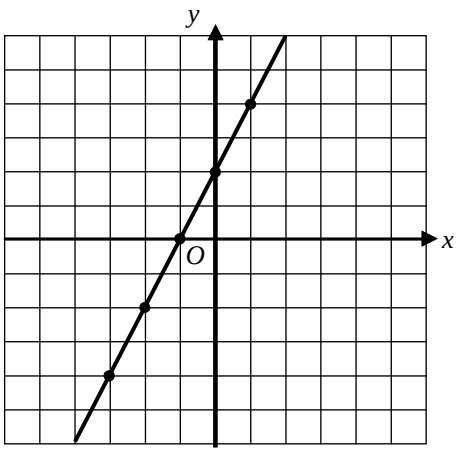
Q3. Sketch the graphs of lines with equations

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

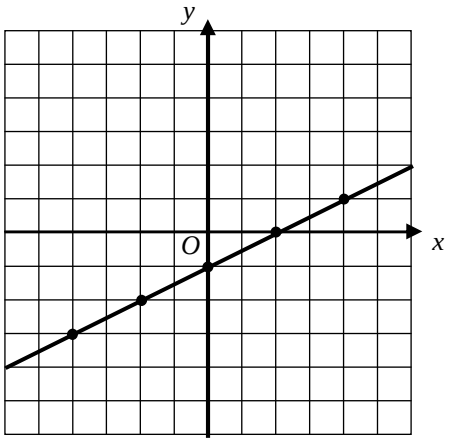
d. $y = \frac{1}{2}x - 2$ **e**. $y = -2x - 1$ **f**. $y = -3x + 2$

Q4. Write down the equation of the lines drawn in the diagrams below.

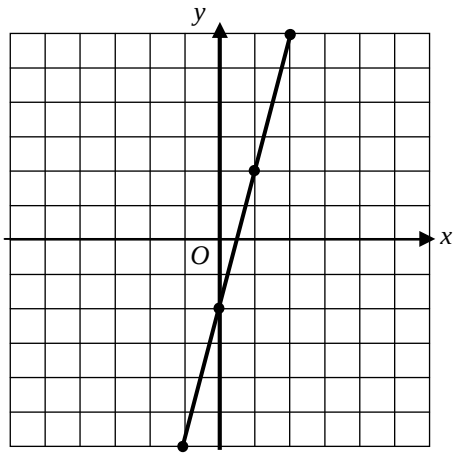
a.



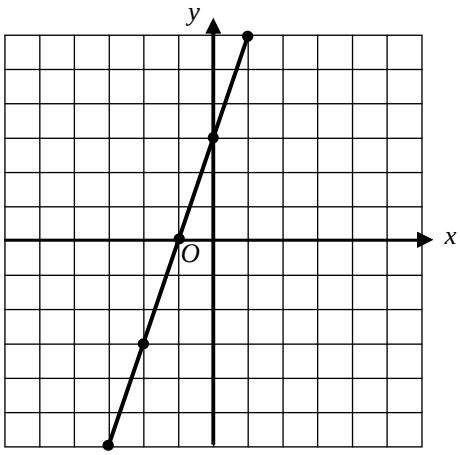
b.



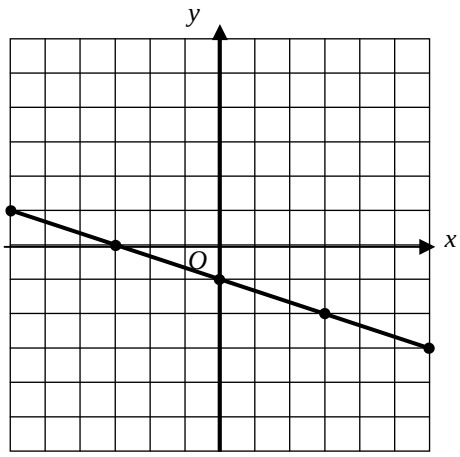
c.



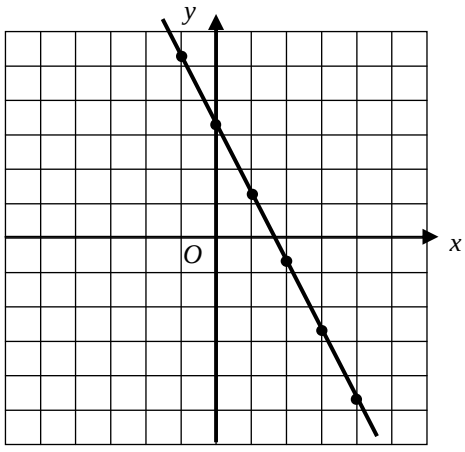
d.



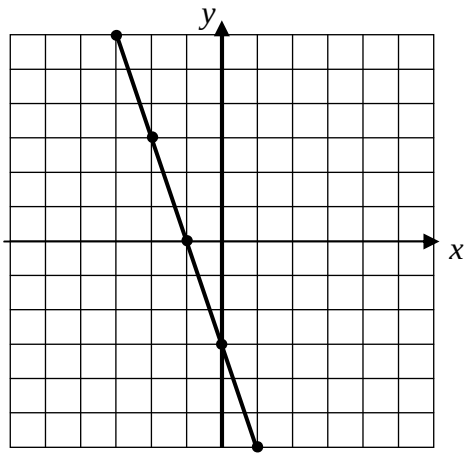
e.



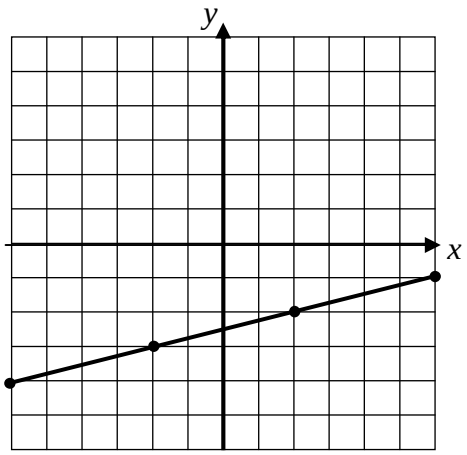
f.



g.



h.



Algebraic Operations 1 ~ Brackets

Q1. Multiply out the brackets :

a.	$3\,(x-5)$	**b**.	$5\,(y+7)$	**c**.	$8\,(a+6)$	**d**.	$6\,(3+t)$
e.	$x\,(x+9)$	**f**.	$y\,(3-y)$	**g**.	$b\,(b-4)$	**h**.	$p\,(5+p)$
i.	$a\,(b+c)$	**j**.	$x\,(x-y)$	**k**.	$p\,(q-r)$	**l**.	$a\,(a+x)$

Q2. Expand the brackets :

a.	$4\,(2a+5)$	**b**.	$7\,(3y-4)$	**c**.	$2\,(12x+11)$	**d**.	$9\,(4c-7)$
e.	$2a\,(a+3)$	**f**.	$5x\,(x-8)$	**g**.	$10y\,(3-y)$	**h**.	$3t\,(t+6)$
i.	$3x\,(2x-9)$	**j**.	$2y\,(7-5y)$	**k**.	$4b\,(3b-8)$	**l**.	$5x\,(5x+4)$

Q3. Expand and simplify :

a.	$3(3a-1)+2a$	**b**.	$2(5x+3)-3x$	**c**.	$8(b+2)-9$
d.	$4(2h-1)+7$	**e**.	$5(3-4x)+11x$	**f**.	$3(2c+1)-8$
g.	$2(4t+3)-10t$	**h**.	$p(p+q)-3pq$	**i**.	$7(1-3c)-10$
j.	$3+2(2x+5)$	**k**.	$7a+3(2a-3)$	**l**.	$5-2(2x-7)$
m.	$6+5(3y-2)$	**n**.	$9b-2(4b-1)$	**o**.	$8-3(5x+7)$
p.	$12x-4(4x-5)$	**q**.	$3c+5(1-2c)$	**r**.	$7-2(5a-12)$

Q4. Multiply out the brackets :

a.	$(x+2)(x+3)$	**b**.	$(y+5)(y+2)$	**c**.	$(a+4)(a+6)$
d.	$(b+3)(b+4)$	**e**.	$(x+9)(x+5)$	**f**.	$(s+3)(s+8)$
g.	$(y+7)(y+4)$	**h**.	$(b+3)(b+3)$	**i**.	$(c+6)(c+7)$
j.	$(a+8)(a+4)$	**k**.	$(y+4)(y+2)$	**l**.	$(x+9)(x+8)$
m.	$(p+12)(p+7)$	**n**.	$(c+5)(c+6)$	**o**.	$(t+7)(t+9)$
p.	$(x+4)(x+9)$	**q**.	$(y+12)(y+5)$	**r**.	$(a+11)(a+9)$

Q5. Multiply out the brackets :

a.	$(x-1)(x-5)$	**b**.	$(c-4)(c-2)$	**c**.	$(y-3)(y-7)$
d.	$(b-6)(b-8)$	**e**.	$(x-5)(x-2)$	**f**.	$(s-8)(s-5)$
g.	$(y-2)(y-9)$	**h**.	$(a-4)(a-4)$	**i**.	$(t-3)(t-6)$
j.	$(x-6)(x-5)$	**k**.	$(b-5)(b-3)$	**l**.	$(c-10)(c-4)$
m.	$(a-3)(a-9)$	**n**.	$(y-8)(y-7)$	**o**.	$(x-12)(x-3)$
p.	$(s-4)(s-7)$	**q**.	$(d-1)(d-15)$	**r**.	$(b-10)(b-1)$

Q6. Multiply out the brackets :

a.	$(x-1)(x+5)$	**b**.	$(a+3)(a-7)$	**c**.	$(t-5)(t+4)$
d.	$(y+8)(y-4)$	**e**.	$(c+2)(c-7)$	**f**.	$(x-6)(x+1)$
g.	$(b-2)(b+9)$	**h**.	$(p-10)(p+2)$	**i**.	$(y-8)(y+7)$
j.	$(z+4)(z-6)$	**k**.	$(x+1)(x-1)$	**l**.	$(a+2)(a-15)$
m.	$(c-3)(c+3)$	**n**.	$(p-7)(p+1)$	**o**.	$(b+10)(b-5)$

Q7. Multiply out the brackets

a.	$(x + 3)^2$	**b**.	$(w - 2)^2$	**c**.	$(a - 5)^2$	**d**	$(c + 8)^2$
e	$(y - 4)^2$	**f**.	$(a + 6)^2$	**g**.	$(b + 1)^2$	**h**.	$(s + 7)^2$
i.	$(b - 9)^2$	**j**.	$(x - 10)^2$	**k**.	$(c - 1)^2$	**l**.	$(y - 3)^2$
m.	$(2x - 1)^2$	**n**.	$(5y + 2)^2$	**o**.	$(3x + 4)^2$	**p**.	$(4b - 5)^2$

Q8. Multiply out the brackets

a.	$(a + b)(c + d)$	**b**.	$(2 + x)(3 + y)$	**c**.	$(a + 4)(b + 5)$
d.	$(p - q)(r - s)$	**e**.	$(1 - a)(7 - b)$	**f**.	$(c - 6)(d + 8)$

Q9. Multiply out the brackets

a.	$x(x^2 + x - 1)$	**b**.	$3(2x^2 - 3x + 5)$	**c**.	$x(3x^2 - 5x + 8)$
d.	$2x(x^2 + 2x + 3)$	**e**.	$-5(x^2 - 8x + 2)$	**f**.	$x(x^2 - 4x - 7)$

Q10. Multiply out the brackets and simplify

a.	$(x + 2)(x^2 + 3x + 1)$	**b**.	$(x + 5)(x^2 + 4x + 2)$
c.	$(x + 1)(x^2 + 5x + 4)$	**d**.	$(x + 3)(x^2 + x + 5)$
e.	$(x + 8)(x^2 + 2x + 3)$	**f**.	$(x + 4)(x^2 + 7x + 6)$
g.	$(x + 12)(x^2 + x + 7)$	**h**.	$(x + 10)(x^2 + 3x + 9)$
i.	$(x + 9)(x^2 + 12x + 7)$	**j**.	$(x + 7)(x^2 + 9x + 1)$
k.	$(x + 3)(x^2 - 5x + 2)$	**l**.	$(x - 6)(x^2 - x + 11)$
m.	$(x + 2)(x^2 - 8x + 3)$	**n**.	$(x + 5)(x^2 - 6x + 7)$
o.	$(x + 10)(x^2 + 3x - 6)$	**p**.	$(x + 9)(x^2 + 5x - 6)$
q.	$(x + 11)(x^2 + x - 2)$	**r**.	$(x + 7)(x^2 + 8x - 3)$

Q11. Multiply out the brackets and simplify

a.	$(x - 1)(x^2 + x + 1)$	**b**.	$(x - 7)(x^2 + 3x + 5)$
c.	$(x - 2)(x^2 + 4x + 3)$	**d**.	$(x - 4)(x^2 + 6x + 1)$
e.	$(x - 3)(x^2 - 2x + 5)$	**f**.	$(x - 6)(x^2 - 5x + 2)$
g.	$(x - 4)(x^2 - x + 2)$	**h**.	$(x - 1)(x^2 - 2x + 7)$
i.	$(x - 9)(x^2 + 3x - 2)$	**j**.	$(x - 5)(x^2 + 8x + 6)$
k.	$(x - 8)(x^2 + x - 7)$	**l**.	$(x - 3)(x^2 + 9x - 12)$
m.	$(x - 5)(x^2 - 4x - 1)$	**n**.	$(x - 10)(x^2 - 3x - 8)$
o.	$(x - 6)(x^2 - 7x - 2)$	**p**.	$(x - 1)(x^2 - 17x - 13)$

Q12. Multiply out the brackets and simplify

a.	$(x + 5)(2x^2 + 4x + 9)$	**b**.	$(x - 3)(5x^2 + x + 6)$
c.	$(x - 2)(6x^2 - 5x + 7)$	**d**.	$(x + 7)(3x^2 + 9x - 2)$
e.	$(x - 4)(5x^2 - x - 8)$	**f**.	$(x + 1)(7x^2 - 2x + 11)$
g.	$(2x + 1)(3x^2 + 4x + 1)$	**h**.	$(3x + 4)(x^2 - 11x + 2)$
i.	$(5x - 2)(2x^2 + 3x - 7)$	**j**.	$(4x - 3)(3x^2 - 5x - 4)$

Algebraic Operations 2 ~ Factors 1

Q1. Factorise by finding the common factor

a.	$2x + 4$	**b**.	$3d + 9$	**c**.	$6s + 3$	**d**.	$12x + 4$
e.	$6 + 9a$	**f**.	$2b + 8$	**g**.	$5y + 10$	**h**.	$10 + 15c$
i.	$12x + 16$	**j**.	$18m + 24$	**k**.	$30 + 36a$	**l**.	$14y + 21$

Q2. Factorise by finding the common factor

a.	$3x - 6$	**b**.	$4y - 8$	**c**.	$16 - 8a$	**d**.	$10c - 15$
e.	$9s - 12$	**f**.	$2b - 14$	**g**.	$12x - 20$	**h**.	$22m - 33$
i.	$15x - 10$	**j**.	$18 - 12y$	**k**.	$25b - 20$	**l**.	$18d - 30$

Q3. Factorise by finding the common factor

a.	$2a + 4b$	**b**.	$10x - 12y$	**c**.	$18m + 24n$	**d**.	$10c + 15d$
e.	$6a - 9x$	**f**.	$18s - 12t$	**g**.	$12x + 15y$	**h**.	$14a - 7b$
i.	$25c + 10d$	**j**.	$9b - 15y$	**k**.	$18x + 24y$	**l**.	$6a + 28b$

Q4. Factorise by finding the common factor

a.	$ax + ay$	**b**.	$xy^2 + xa^2$	**c**.	$pqr + pst$
d.	$xay - bac$	**e**.	$pq + p$	**f**.	$y^2 + y$
g.	$a^2 - ab$	**h**.	$ab - bc$	**i**.	$n^2 - 3n$
j.	$xy + y^2$	**k**.	$abc - abd$	**l**.	$fgh - efg$

Q5. Factorise by finding the highest common factor

a.	$2ax + 6a$	**b**.	$3y + 9y^2$	**c**.	$24a - 16ab$
d.	$pq^2 - pq$	**e**.	$12xy - 9xz$	**f**.	$6b^2 - 4b$
g.	$3a^2 + 27ah$	**h**.	$15abc + 20abd$	**i**.	$3s^3 - 9s^2$
j.	$14x - 12xyz$	**k**.	$10b^2c - 15bcd$	**l**.	$2\pi r^2 + 2\pi rh$

Q6. Factorise

a.	$ap + aq - ar$	**b**.	$2a + 2b + 2c$	**c**.	$6e - 2f + 4g$
d.	$p^2 + pq + xp$	**e**.	$3ab - 6bc - 9bd$	**f**.	$\frac{1}{2} ah + \frac{1}{2} bh + \frac{1}{2} ch$
g.	$5x^2 - 8xy + 5x$	**h**.	$4ac + 6ad - 10a^2$	**i**.	$15p^2 + 10pq + 20ps$

Q7. Factorise

a.	$ab^2c - a^2bd$	**b**.	$a^3 - a^2 - a$	**c**.	$2x^2 - 50x + 12xy$
d.	$x^6 + x^4 + x^2$	**e**.	$25p^2 + 15pq + 10p$	**f**.	$x^2yz + axy + bxy^2$
g.	$3a^4 + 9a^3 - 6a$	**h**.	$abx + bcx - bcy$	**i**.	$\frac{1}{2} gtT - \frac{1}{2} gt^2$

Algebraic Operations 2 ~ Factors 2

Q1. Factorise the following expressions, which contain a difference of squares

a.	$a^2 - b^2$	**b**.	$x^2 - y^2$	**c**.	$p^2 - q^2$	**d**.	$s^2 - t^2$
e.	$a^2 - 3^2$	**f**.	$x^2 - 2^2$	**g**.	$p^2 - 9^2$	**h**.	$c^2 - 5^2$
i.	$b^2 - 1$	**j**.	$y^2 - 16$	**k**.	$m^2 - 25$	**l**.	$a^2 - 9$
m.	$36 - d^2$	**n**.	$4 - q^2$	**o**.	$49 - w^2$	**p**.	$x^2 - 64$

Q2. Factorise the following expressions, which contain a difference of squares

a.	$a^2 - 4b^2$	**b**.	$x^2 - 25y^2$	**c**.	$p^2 - 64q^2$	**d**.	$16c^2 - d^2$
e.	$81 - 4g^2$	**f**.	$36w^2 - y^2$	**g**.	$4a^2 - 1$	**h**.	$g^2 - 81h^2$
i.	$49x^2 - y^2$	**j**.	$9c^2 - 16d^2$	**k**.	$4p^2 - 9q^2$	**l**.	$b^2 - 100c^2$
m.	$25 - 16a^2$	**n**.	$4d^2 - 121$	**o**.	$225 - 49k^2$	**p**.	$9x^2 - 0.25$

Q3. Factorise the following expressions

a.	$2a^2 - 2b^2$	**b**.	$5p^2 - 5$	**c**.	$45 - 5x^2$	**d**.	$4d^2 - 36$
e.	$2y^2 - 50$	**f**.	$4b^2 - 100$	**g**.	$3q^2 - 27$	**h**.	$8a^2 - 32b^2$
i.	$ab^2 - 64a$	**j**.	$xy^2 - 25x$	**k**.	$abc^2 - ab$	**l**.	$8p^2 - 50q^2$
m.	$2x^2 - 2.88$	**n**.	$ak^2 - 121a$	**o**.	$10s^2 - 2.5$	**p**.	$\frac{1}{2} y^2 - 450$

Q4. Factorise the following quadratic expressions

a.	$x^2 + 3x + 2$	**b**.	$a^2 + 2a + 1$	**c**.	$y^2 + 5y + 4$
d.	$c^2 + 8x + 7$	**e**.	$x^2 + 6x + 9$	**f**.	$b^2 + 8b + 12$
g.	$a^2 + 9a + 14$	**h**.	$w^2 + 10w + 9$	**i**.	$d^2 + 7d + 10$
j.	$x^2 + 10x + 21$	**k**.	$p^2 + 9p + 20$	**l**.	$c^2 + 10c + 24$
m.	$s^2 + 12s + 36$	**n**.	$x^2 + 11x + 28$	**o**.	$y^2 + 10y + 25$

Q5. Factorise the following quadratic expressions

a.	$a^2 - 8a + 15$	**b**.	$x^2 - 9x + 8$	**c**.	$c^2 - 9c + 18$
d.	$y^2 - 4y + 4$	**e**.	$b^2 - 6b + 5$	**f**.	$x^2 - 15x + 14$
g.	$c^2 - 10c + 16$	**h**.	$x^2 - 7x + 6$	**i**.	$y^2 - 12n + 32$
j.	$p^2 - 11p + 24$	**k**.	$a^2 - 13a + 36$	**l**.	$x^2 - 15x + 36$
m.	$b^2 - 4b + 3$	**n**.	$q^2 - 11q + 10$	**o**.	$a^2 - 7y + 12$

Q6. Factorise the following expressions

a.	$b^2 + 3b - 10$	**b**.	$x^2 + 6x - 7$	**c**.	$y^2 - y - 6$
d.	$a^2 - a - 20$	**e**.	$q^2 + 2q - 8$	**f**.	$x^2 - 8x - 20$
g.	$d^2 + 4d - 21$	**h**.	$c^2 + 9c - 36$	**i**.	$p^2 - 5p - 24$
j.	$y^2 - 7y - 8$	**k**.	$a^2 + 5a - 6$	**l**.	$x^2 - 5x + 36$
m.	$b^2 - 4b - 5$	**n**.	$s^2 + 2s - 24$	**o**.	$d^2 + 6d - 16$

Q7. Factorise the following expressions

a.	$3x^2 + 7x + 2$	**b**.	$2a^2 + 5a + 2$	**c**.	$3c^2 + 8c + 5$
d.	$2p^2 + 11p + 9$	**e**.	$2y^2 + 11y + 5$	**f**.	$3d^2 + 11d + 6$
g.	$5q^2 + 9q + 4$	**h**.	$4b^2 + 8b + 3$	**i**.	$6x^2 + 13x + 6$
j.	$3a^2 + 14a + 15$	**k**.	$10x^2 + 17x + 3$	**l**.	$9c^2 + 6c + 1$
m.	$6y^2 + 11y + 3$	**n**.	$3b^2 + 5b + 2$	**o**.	$8x^2 + 14x + 3$

Q8. Factorise the following expressions

a.	$2x^2 - 7x + 3$	**b**.	$2a^2 - 5a + 3$	**c**.	$5p^2 - 17p + 6$
d.	$5b^2 - 7b + 2$	**e**.	$6x^2 - 7x + 2$	**f**.	$4y^2 - 11y + 6$
g.	$7c^2 - 29c + 4$	**h**.	$4m^2 - 9m + 2$	**i**.	$16a^2 - 10a + 1$
j.	$8y^2 - 22y + 5$	**k**.	$3p^2 - 37p + 12$	**l**.	$4x^2 - 25x + 6$
m.	$15a^2 - 16a + 4$	**n**.	$24c^2 - 22c + 3$	**o**.	$6b^2 - 35b + 36$

Q9. Factorise the following expressions

a.	$3x^2 - 2x - 1$	**b**.	$2a^2 - a - 3$	**c**.	$4p^2 - p - 3$
d.	$2c^2 + 7c - 4$	**e**.	$6y^2 - 11y - 2$	**f**.	$3w^2 + 10w - 8$
g.	$3m^2 + 2m - 5$	**h**.	$4q^2 + 5q - 6$	**i**.	$6b^2 + 7b - 20$
j.	$4t^2 - 4t - 3$	**k**.	$12z^2 + 16z - 3$	**l**.	$4d^2 - 4d - 15$
m.	$7s^2 - 27s - 4$	**n**.	$15x^2 + 16x - 15$	**o**.	$36v^2 + v - 2$

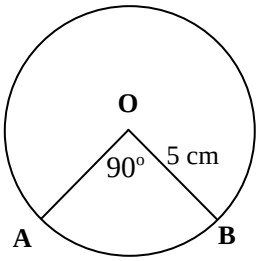
Q10. Fully factorise these expressions

a.	$3x^2 - 3$	**b**.	$2p^2 + 12p + 10$	**c**.	$9x^2 - 36$
d.	$5x^2 + 25x + 30$	**e**.	$ax^2 + 5ax + 6a$	**f**.	$3y^2 - 12y - 15$
g.	$15c^2 + 27c + 12$	**h**.	$16b^2 + 28b + 6$	**i**.	$9q^2 + 33q + 18$
j.	$10s^2 - 35s + 15$	**k**.	$8m^2 - 20m + 12$	**l**.	$8a^2 - 36a + 36$
m.	$4t^2 + 2t - 56$	**n**.	$90d^2 - 60d - 80$	**o**.	$400x^2 - 4$

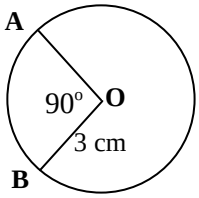
The Circle ~ Arcs & Sectors

Q1. Find the length of the minor arc AB in each of the following circles

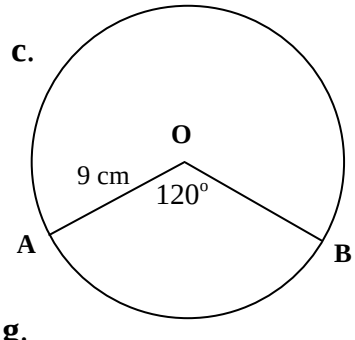
a.



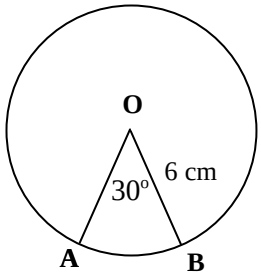
b.



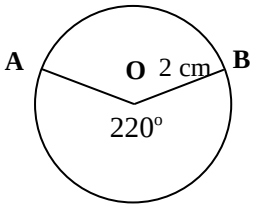
c.



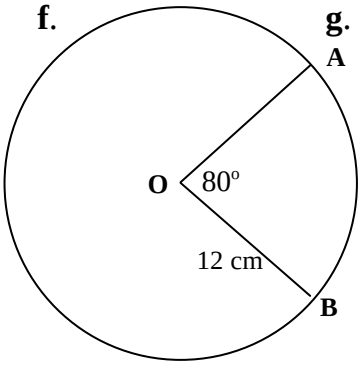
d.



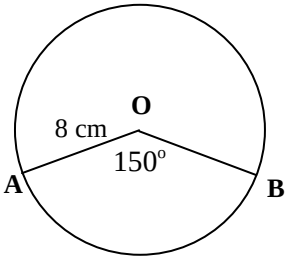
e.



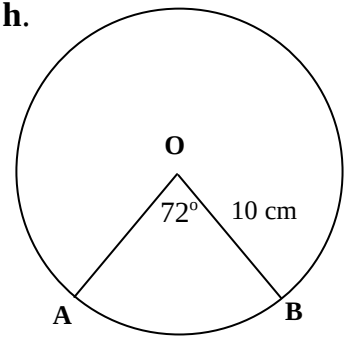
f.



g.

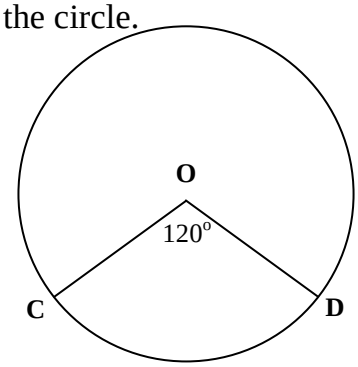


h.

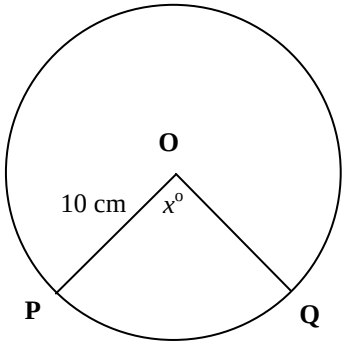


Q2. Calculate the area of sector OAB in the circles shown in **Q1** above.

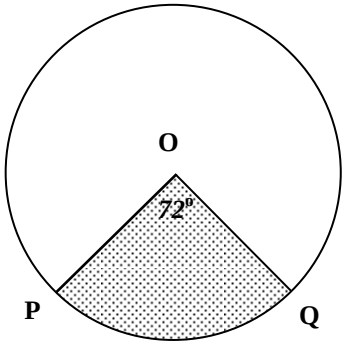
Q3. The length of arc CD is 7.33 cm. Calculate the circumference of the circle.



Q4. The area sector OPQ is 78.5 cm^2. Calculate the size of angle x^o.



Q5.

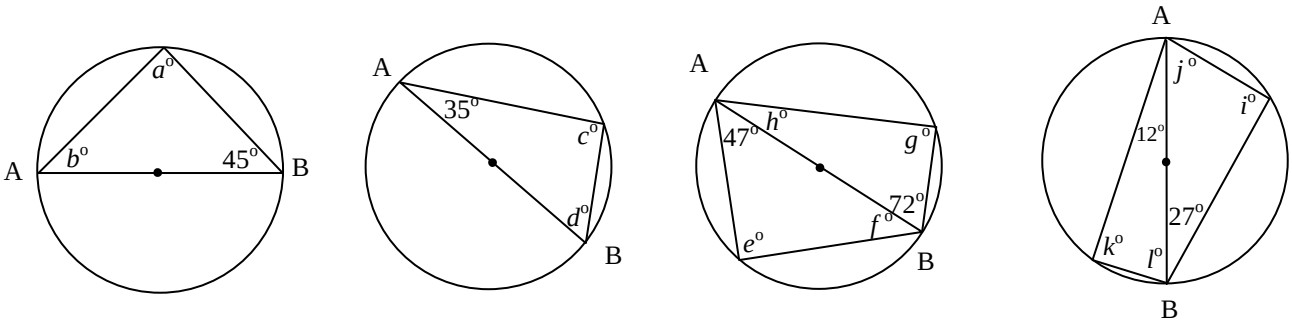


The area of the shaded sector is 5.024 cm^2.

Calculate the area of the circle.

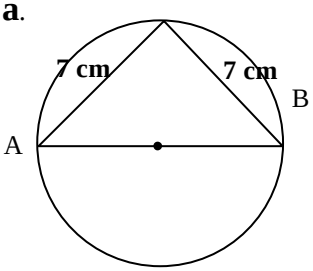
The Circle ~ Symmetry & Chords

Q1. In each of the diagrams below AB is a diameter. Find the missing angles in each diagram.

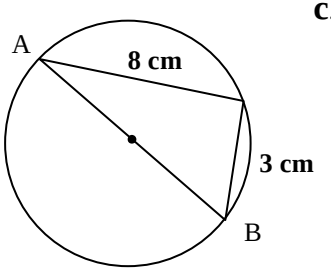


Q2. Find the length of the diameter AB in each of the circles below, given the other 2 sides of the triangle.

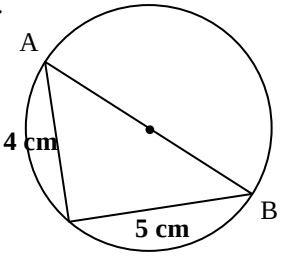
a.



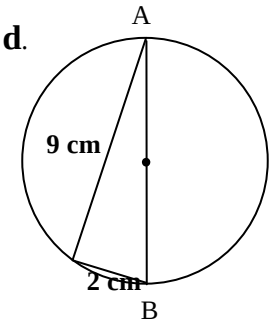
b.



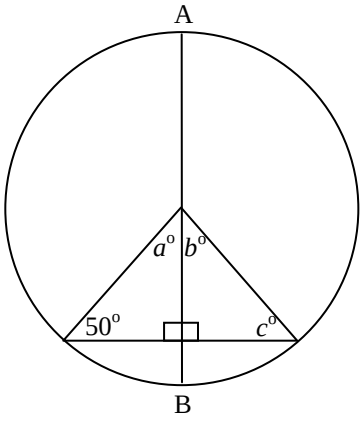
c.

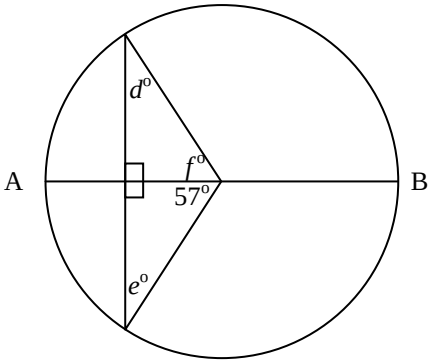


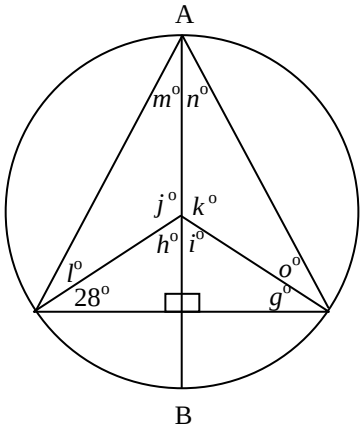
d.



Q3. Use the symmetry properties of the circle to find the missing angles in the diagrams below. In each diagram AB is a diameter.

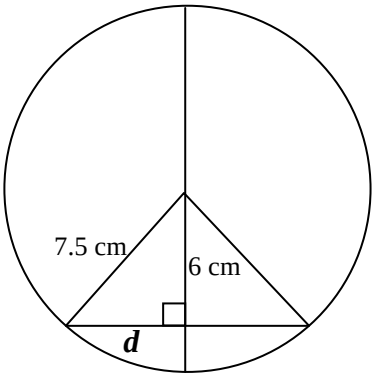




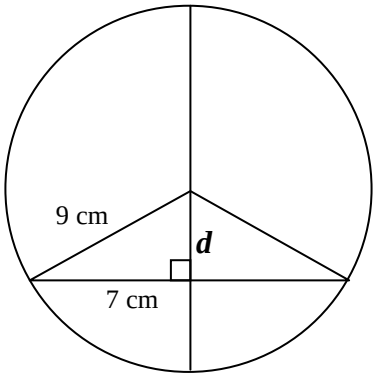


Q4. Calculate the length of ***d*** in each diagram.

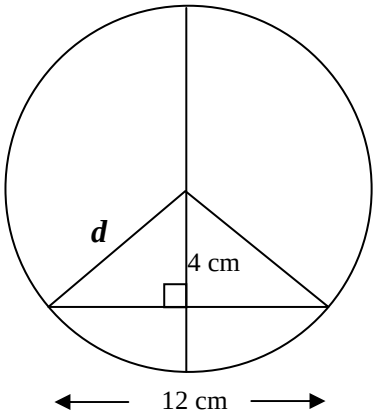
a.



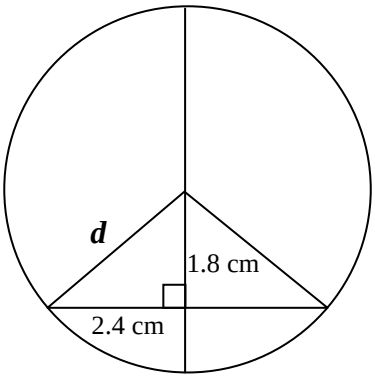
b.



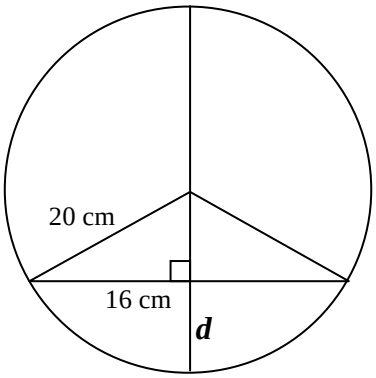
c.



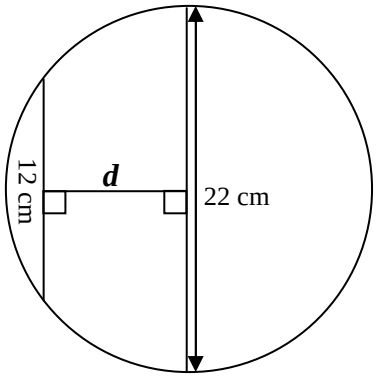
d.



e.

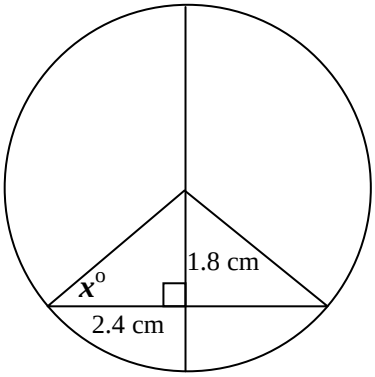


f.

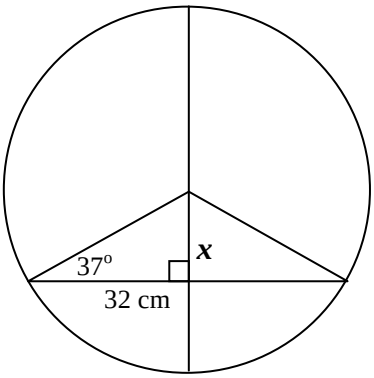


Q5. Find ***x*** in each of the triangles below.

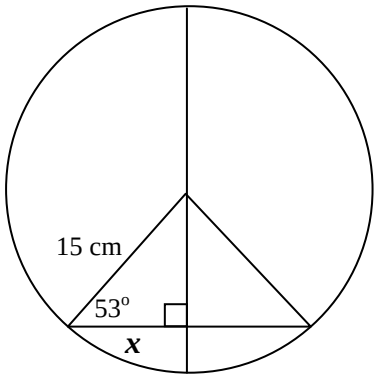
a.



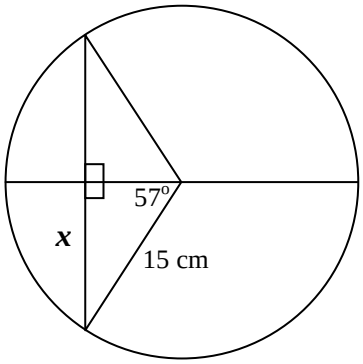
b.



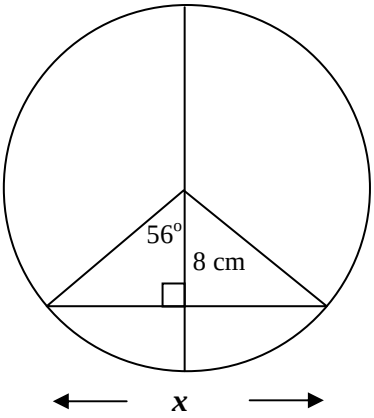
c.



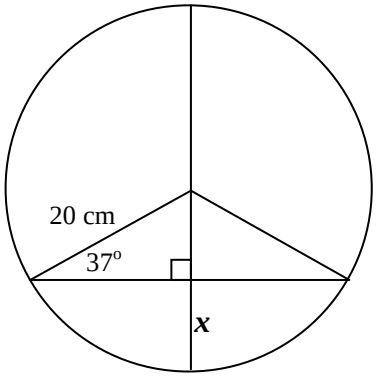
d.



e.

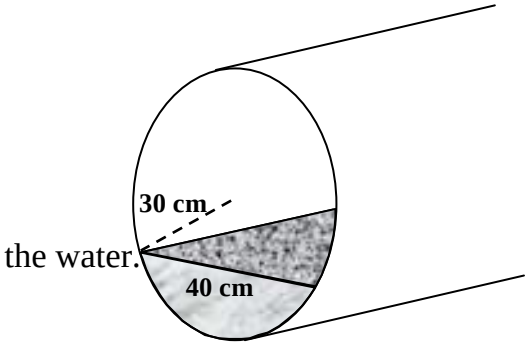


f.



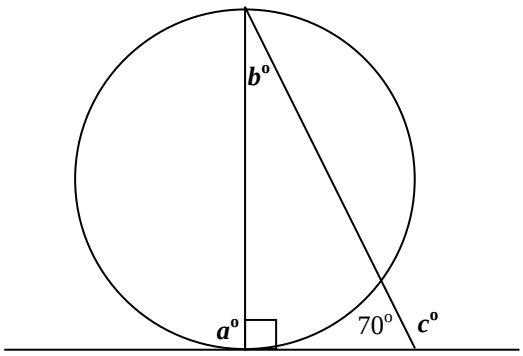
Q6. A cylindrical pipe is used to transport water underground.
The radius of the pipe is 30 cm and the width of the water surface is 40 cm.

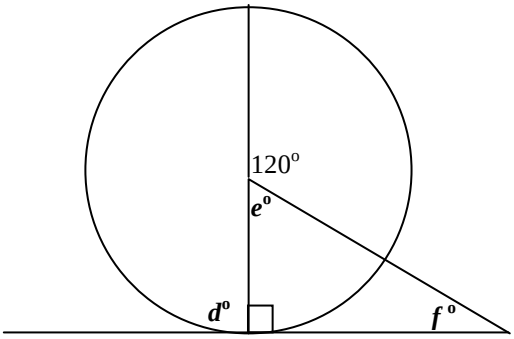
Calculate the height of the pipe above the water.

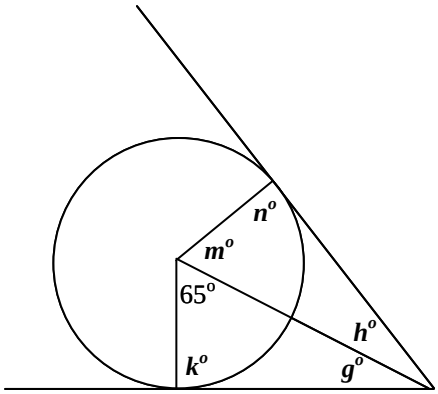


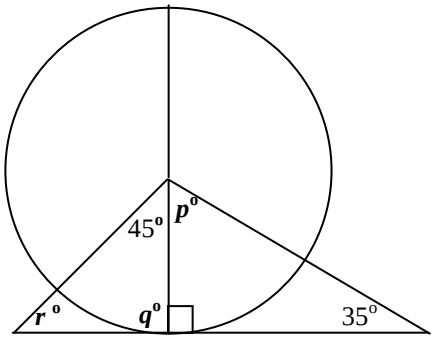
The Circle ~ Tangents & Angles

Q1. Calculate the sizes of the angles marked ***a***, ***b***, ...***r***, in the diagrams below.



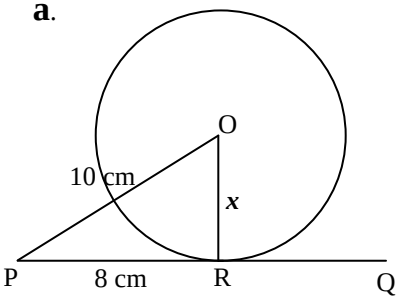




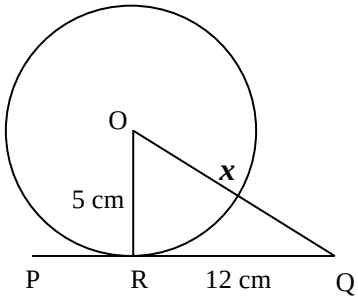


Q2. In each of the diagrams below, PQ is a tangent which touches the circle at R.
Calculate the lengths of the lines marked ***x***.

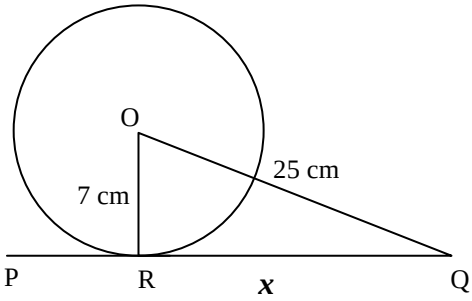
a.



b.

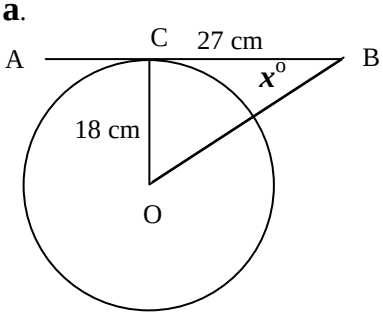


c.

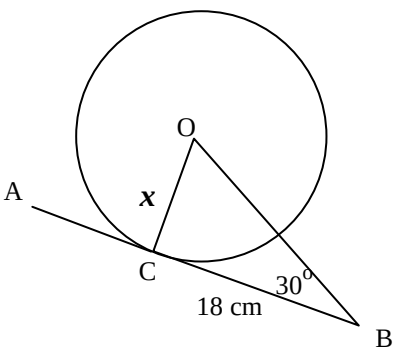


Q3. In each of the diagrams below, AB is a tangent which touches the circle at C.
Calculate ***x*** for each diagram.

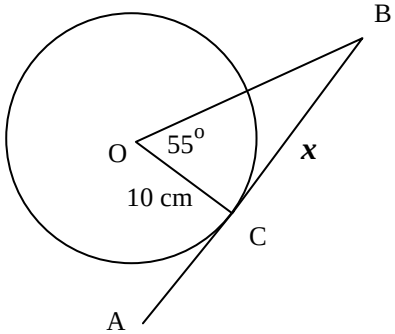
a.



b.



c.



ANSWERS

Percentages – appreciation & depreciation

Q1. **a**. £2332.80, £332.80 **b**. £5955.08, £955.08 **c**. £5495.42, £495.42
d. £4348.04, £848.04 **e**. £1982.12, £382.12 **f**. 2393.35, 643.35
g. £23820.32, 3820.32 **h**. £21190.05, 3190.05 **i**. £64751.45, £14751.45
j. £439.32, £39.32

Q2. £3136.32 **Q3**. £92317 **Q4**. £212.24 **Q5**. 6300 million
Q6. £1536 **Q7**. £5644.80 **Q8**. **a**. 270 000 **b**. after 3 years

Significant Figures

Q1. **a**. 20 **b**. 6 **c**. 80 **d**. 30 **e**. 100 **f**. 300 **g**. 300
h. 800 **i**. 8000 **j**. 2000 **k**. 8000 **l**. 5000 **m**. 10 **n**. 600
o. 4 **p**. 10000 **q**. 1 **r**. 100 **s**. 0.9 **t**. 600

Q2. **a**. 8.7 **b**. 93 **c**. 0.19 **d**. 680 **e**. 2.1 **f**. 6.5 **g**. 31
h. 26 **i**. 24 **j**. 19 **k**. 6400 **l**. 5.0 **m**. 0.053 **n**.0.0061
o. 0.087 **p**. 14000 **q**. 2.5 **r**. 45000 **s**. 29 **t**. 0.76

Q3. **a**. 49.3 **b**. 2.35 **c**. 0.593 **d**. 4770 **e**. 6.08 **f**. 24200 **g**.0.0628
h. 29.5 **i**. 0.00947 **j**. 56200 **k**. 0.0980 **l**. 24.5 **m**. 28.3 **n**. 2460
o. 3170 **p**. 30.0 **q**. 2.68 **r**. 3090 **s**. 2.10 **t**. 0.000318

Q4. **a**. 248400 **b**. 248000 **c**. 250000 **d**. 200000

Q5. **a**. 0.02860 **b**. 0.0286 **c**. 0.029 **d**. 0.03

Q6. **a**. 120 **b**. 4.0 **c**. 250 **d**. 41 **e**. 49 **f**. 0.49
g. 3.8 **h**. 0.084 **i**. 250 **j**. 17 **k**. 500 **l**. 65

Q7. **a**. 133 **b**. 4.78 **c**. 56.5 **d**. 988 **e**. 8.78 **f**. 334
g. 19.8 **h**. 26.3 **i**. 0.0965 **j**. 326 **k**. 2.07 **l**. 0.953

Volumes of Solids

Q1. **a**. 120 cm^3 **b**. 144 cm^3 **c**. 6 m^3 **d**. 2150 cm^3 **e**. 343 cm^3
f. 360 cm^3 **g**. 224.1 cm^3 **h**. 357.76 cm^3 **i**. 510000 mm^3 **j**. 7148.5 cm^3

Q2. **a**. 42 cm^3 **b**. 48 cm^3 **c**. 135 cm^3 **d**. 1000 cm^3 **e**. 528 cm^3
f. 787.5 cm^3 **g**. 238 cm^3 **h**. 337500 cm^3 **i**. 502.2 cm^3 **j**. 750000 mm^3

Q3. **a**. 1696.5 cm^3 **b**. 4825.5 cm^3 **c**. 603.2 cm^3 **d**. 2513.3 cm^3 **e**. 75398.2 cm^3
f. 3078.8 cm^3 **g**. 28274.3 cm^3 **h**. 13304.6 cm^3 **i**. 760265 cm^3 **j**. 7298.5 cm^3

Q4. **a**. 366.5 cm^3 **b**. 1283 cm^3 **c**. 207.3 cm^3 **d**. 1055.6 cm^3 **e**. 5236.0 cm^3
f. 1340.4 cm^3 **g**. 9424.8 cm^3 **h**. 4688.3 cm^3 **i**. 63355.5 mm^3 **j**. 2432.8 cm^3

Q5. **a**. 4188.8 cm^3 **b**. 65449.8 cm^3 **c**. 33.5 m^3 **d**. 33510322 mm^3 **e**. 5575.3 cm^3
f. 24429.0 cm^3 **g**. 2144661 mm^3 **h**. 696910 cm^3 **i**. 179.6 m^3 **j**. 463246.7

Q6. **a**. 1006 cm^2 **b**. 45270 cm^3

Q7. 540 m^3

Linear Relationships ~ Gradients

Q1. **a**. 1 **b**. 2 **c**. $^2/_3$ **d**. 5 **e**. $^1/_3$ **f**. $^3/_2$
g. –3 **h**. $-^1/_2$ **k**. $-^3/_2$ **l**. –1 **m**. –6 **n**. $-^1/_8$

Q2. **a**. –3 **b**. ½ **c**. 1 **d**. – ½ **e**. $^2/_5$ **f**. 4

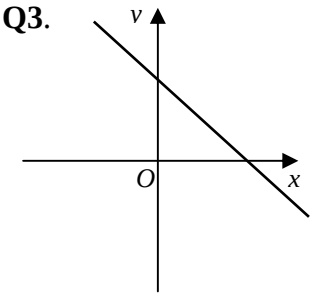
Q3. **a**. ½ **b**. –2 **c**. 3 **d**. $^3/_2$ **e**. – ½ **f**. –3
g. 5 **h**. 4 **i**. $-^5/_2$

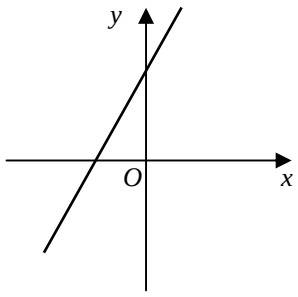
Linear Relationships ~Straight Lines

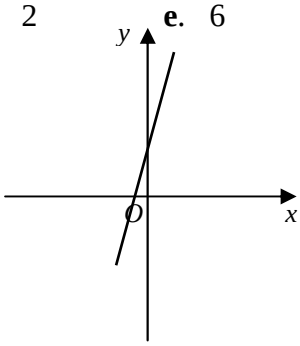
Q1. **a**. 3, (0,1) **b**. ½ , (0, –5) **c**. –2, (0, 3)
d. $-\frac{1}{4}$, (0, –2) **e**. 8, (0, –½) **f**. –1, (0, 4)

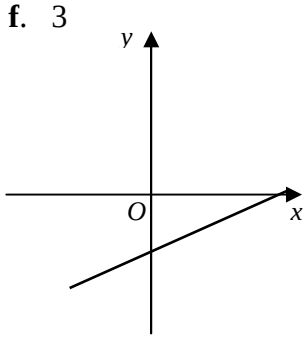
Q2. **a**. 5 **b**. 1 **c**. 4 **d**. 2 **e**. 6 **f**. 3

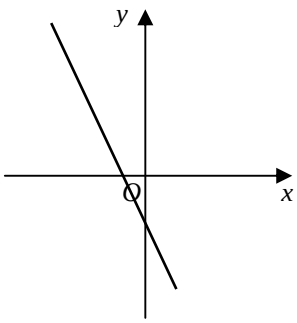
Q3.

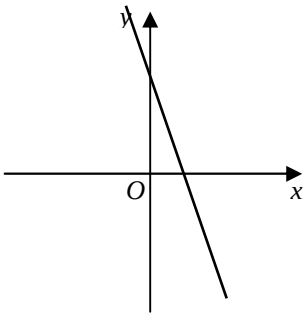












Algebraic Operations 1 ~ Brackets

Q1.	**a**.	$3x - 15$	**b**.	$5y + 35$	**c**.	$8a + 48$	**d**.	$18 + 6t$
	e.	$x^2 + 9x$	**f**.	$3y - y^2$	**g**.	$b^2 - 4b$	**h**.	$5p + p^2$
	i.	$ab + ac$	**j**.	$x^2 - xy$	**k**.	$pq - pr$	**l**.	$a^2 + ax$
Q2.	**a**.	$8a + 20$	**b**.	$21y - 28$	**c**.	$24x + 22$	**d**.	$36c - 63$
	e.	$2a^2 + 6a$	**f**.	$5x^2 - 40x$	**g**.	$30y - 10y^2$	**h**.	$3t^2 + 18t$
	i.	$6x^2 - 27x$	**j**.	$14y - 10y^2$	**k**.	$12b^2 - 32b$	**l**.	$25x^2 + 20x$
Q3.	**a**.	$11a - 3$	**b**.	$7x + 6$	**c**.	$8b - 7$	**d**.	$8h + 3$
	e.	$15 - 9x$	**f**.	$6c - 5$	**g**.	$-2t + 6$	**h**.	$p^2 - 2p$
	i.	$-3 - 21c$	**j**.	$13 + 4x$	**k**.	$13a - 9$	**l**.	$19 - 4x$
	m.	$-4 + 15y$	**n**.	$b + 2$	**o**.	$-13 - 15x$	**p**.	$-4x + 20$
	q.	$-7c + 5$	**r**.	$31 - 10a$				
Q4.	**a**.	$x^2 + 5x + 6$	**b**.	$y^2 + 7y + 10$	**c**.	$a^2 + 10a + 24$	**d**.	$b^2 + 7b + 12$
	e.	$x^2 + 14x + 45$	**f**.	$s^2 + 11s + 24$	**g**.	$y^2 + 11y + 28$	**h**.	$b^2 + 6b + 9$
	i.	$c^2 + 13c + 42$	**j**.	$a^2 + 12a + 32$	**k**.	$y^2 + 6y + 8$	**l**.	$x^2 + 17x + 72$
	m.	$p^2 + 19p + 84$	**n**.	$c^2 + 11c + 30$	**o**.	$t^2 + 16t + 63$	**p**.	$x^2 + 13x + 36$
	q.	$y^2 + 17y + 60$	**r**.	$a^2 + 20a + 99$				
Q5.	**a**.	$x^2 - 6x + 5$	**b**.	$c^2 - 6c + 8$	**c**.	$y^2 - 10y + 21$	**d**.	$b^2 - 14b + 48$
	e.	$x^2 - 7x + 10$	**f**.	$s^2 - 13s + 40$	**g**.	$y^2 - 11y + 18$	**h**.	$a^2 - 8a + 16$
	i.	$t^2 - 9t + 18$	**j**.	$x^2 - 11x + 30$	**k**.	$b^2 - 8b + 15$	**l**.	$c^2 - 14c + 40$
	m.	$a^2 - 12a + 27$	**n**.	$y^2 - 15y + 56$	**o**.	$x^2 - 15x + 36$	**p**.	$s^2 - 11s + 28$
	q.	$d^2 - 16d + 15$	**r**.	$b^2 - 11b + 10$				
Q6.	**a**.	$x^2 + 4x - 5$	**b**.	$a^2 - 4a - 21$	**c**.	$t^2 - t - 20$	**d**.	$y^2 + 4y - 32$
	e.	$c^2 - 5c - 14$	**f**.	$x^2 - 5x - 6$	**g**.	$b^2 + 7b - 18$	**h**.	$p^2 - 8p - 20$
	i.	$y^2 - y - 56$	**j**.	$z^2 - 2z - 24$	**k**.	$x^2 - 1$	**l**.	$a^2 - 13a - 30$
	m.	$c^2 - 9$	**n**.	$p^2 - 6p - 7$	**o**.	$b^2 + 5b - 50$	**p**.	$s^2 + 5s - 36$
	q.	$y^2 - 6y - 27$	**r**.	$x^2 - 10x - 11$				

Q7. **a**. $x^2 + 6x + 9$ **b**. $w^2 - 4w + 4$ **c**. $a^2 - 10a + 25$ **d**. $c^2 + 16c + 64$
e. $y^2 - 8y + 16$ **f**. $a^2 + 12a + 36$ **g**. $b^2 + 2b + 1$ **h**. $s^2 + 14s + 49$
i. $b^2 - 18b + 81$ **j**. $x^2 - 20x + 100$ **k**. $c^2 - 2c + 1$ **l**. $y^2 - 6y + 9$
m. $4x^2 - 4x + 1$ **n**. $25y^2 + 20y + 4$ **o**. $9x^2 + 24x + 16$ **p**. $16b^2 - 40b + 24$

Q8. **a**. $ac + bc + ad + bd$ **b**. $6 + 3x + 2y + xy$ **c**. $ab + 4b + 5a + 20$
d. $pr - qp - ps + qs$ **e**. $7 - 7a - b + ab$ **f**. $cd - 6d + 8c - 48$

Q9. **a**. $x^3 + x^2 - x$ **b**. $6x^2 - 9x + 15$ **c**. $3x^3 - 5x^2 + 8x$
d. $2x^3 + 4x^2 + 6x$ **e**. $-5x^2 + 40x - 10$ **f**. $x^3 - 4x^2 - 7x$

Q10. **a**. $x^3 + 5x^2 + 7x + 2$ **b**. $x^3 + 9x^2 + 22x + 10$ **c**. $x^3 + 6x^2 + 9x + 4$
d. $x^3 + 4x^2 + 8x + 15$ **e**. $x^3 + 10x^2 + 19x + 24$ **f**. $x^3 + 11x^2 + 34x + 24$
g. $x^3 + 13x^2 + 19x + 84$ **h**. $x^3 + 13x^2 + 39x + 90$ **i**. $x^3 + 21x^2 + 115x + 63$
j. $x^3 + 16x^2 + 64x + 7$ **k**. $x^3 - 2x^2 - 13x + 6$ **l**. $x^3 - 7x^2 + 17x - 66$
m. $x^3 - 6x^2 - 13x + 6$ **n**. $x^3 - x^2 - 23x + 35$ **o**. $x^3 + 13x^2 + 34x - 60$
p. $x^3 + 14x^2 + 39x - 54$ **q**. $x^3 + 12x^2 + 9x - 22$ **r**. $x^3 + 15x^2 + 53x - 21$

Q11. **a**. $x^3 - 1$ **b**. $x^3 - 4x^2 - 16x - 35$ **c**. $x^3 + 2x^2 - 5x - 6$
d. $x^3 + 2x^2 - 23x - 4$ **e**. $x^3 - 5x^2 + 11x - 15$ **f**. $x^3 - 11x^2 + 32x - 12$
g. $x^3 - 5x^2 + 6x - 8$ **h**. $x^3 - 3x^2 + 9x - 7$ **i**. $x^3 - 6x^2 - 29x + 18$
j. $x^3 + 3x^2 - 34x - 30$ **k**. $x^3 - 7x^2 - 15x + 56$ **l**. $x^3 + 6x^2 - 39x + 36$
m. $x^3 - 9x^2 + 19x + 5$ **n**. $x^3 - 13x^2 + 22x + 80$ **o**. $x^3 - 13x^2 + 40x + 12$
p. $x^3 - 18x^2 + 4x + 13$

Q12. **a**. $2x^3 + 14x^2 + 29x + 45$ **b**. $5x^3 - 14x^2 + 3x - 18$ **c**. $6x^3 - 17x^2 + 17x - 14$
d. $3x^3 + 30x^2 + 61x - 14$ **e**. $5x^3 - 21x^2 - 12x + 32$ **f**. $7x^3 + 5x^2 + 9x + 11$
g. $6x^3 + 11x^2 + 6x + 1$ **h**. $3x^3 - 29x^2 - 38x + 8$ **i**. $10x^3 + 11x^2 - 41x + 14$
j. $12x^3 - 29x^2 - x + 12$

Algebraic Operations 2 ~ Factors 1

Q1. **a**. $2(x + 2)$ **b**. $3(d + 3)$ **c**. $3(2s + 1)$ **d**. $4(3x + 1)$
e. $3(2 + 3a)$ **f**. $2(b + 4)$ **g**. $5(y + 2)$ **h**. $5(2 + 3c)$
i. $4(3x + 4)$ **j**. $6(3m + 4)$ **k**. $6(5 + 6a)$ **l**. $7(2y + 3)$

Q2. **a**. $3(x - 2)$ **b**. $4(y - 2)$ **c**. $8(2 - a)$ **d**. $5(2c - 3)$
e. $3(3s - 4)$ **f**. $2(b - 7)$ **g**. $4(3x - 5)$ **h**. $11(2m - 3)$
i. $5(3x - 2)$ **j**. $6(3 - 2y)$ **k**. $5(5b - 4)$ **l**. $6(3d - 5)$

Q3. **a**. $2(a + 2b)$ **b**. $2(5x + 6y)$ **c**. $6(3m + 4n)$ **d**. $5(2c + 3d)$
e. $3(2a - 3x)$ **f**. $6(3s - 2t)$ **g**. $3(4x + 5y)$ **h**. $7(2a - b)$
i. $5(5c + 2d)$ **j**. $3(3b - 5y)$ **k**. $6(3x + 4y)$ **l**. $2(3a + 14b)$

Q4. **a**. $a(x + y)$ **b**. $x(y^2 + a^2)$ **c**. $p(qr + st)$ **d**. $a(xy - bc)$
e. $p(q + 1)$ **f**. $y(y + 1)$ **g**. $a(a - b)$ **h**. $b(a - c)$
i. $n(n - 3)$ **j**. $y(x + y)$ **k**. $ab(c - d)$ **l**. $fg(h - e)$

Q5. **a**. $2a(a + 3)$ **b**. $3y(1 + 3y)$ **c**. $8a(3 - 2b)$ **d**. $pq(q - 1)$
e. $3x(4y - 3z)$ **f**. $2b(3b - 2)$ **g**. $3a(a + 9h)$ **h**. $5ab(3c + 4d)$
i. $3s^2(s - 3)$ **j**. $2x(7 - 6yz)$ **k**. $5bc(2b - 3d)$ **l**. $2\pi r(r + h)$

Q6. **a**. $a(p + q + r)$ **b**. $2(a + b + c)$ **c**. $2(3e - f + 2g)$
d. $p(p + q + x)$ **e**. $3b(a - 2c - 3d)$ **f**. $\frac{1}{2} h(a + b + c)$
g. $x(5x - 8y + 5)$ **h**. $2a(2c + 3d - 5a)$ **i**. $5p(3p + 2q + 4s)$

Q7. **a**. $ab(bc - ad)$ **b**. $a(a^2 - a - 1)$ **c**. $2x(x - 25 + 6y)$
d. $x^2(x^4 + x^2 + 1)$ **e**. $5p(5p + 3q + 2)$ **f**. $xy(xz + a + by)$
g. $3a(a^3 + 3a^2 - 2)$ **h**. $b(ax + cx - cy)$ **i**. $\frac{1}{2} gt(T - t)$

Algebraic Operations 2 ~ Factors 2

Q1.	**a**.	$(a-b)(a+b)$	**b**.	$(x-y)(x+y)$	**c**.	$(p-q)(p+q)$
	d.	$(s-t)(s+t)$	**e**.	$(a-3)(a+3)$	**f**.	$(x-2)(x+2)$
	g.	$(p-9)(p+9)$	**h**.	$(c-5)(c+5)$	**i**.	$(b-1)(b+1)$
	j.	$(y-4)(y+4)$	**k**.	$(m-5)(m+5)$	**l**.	$(a-3)(a+3)$
	m.	$(6-d)(6+d)$	**n**.	$(4-q)(4+q)$	**o**.	$(7-w)(7+w)$
	p.	$(x-8)(x+8)$				
Q2.	**a**.	$(a-2b)(a+2b)$	**b**.	$(x-5y)(x+5y)$	**c**.	$(p-8q)(p+8q)$
	d.	$(4c-d)(4c+d)$	**e**.	$(9-2y)(9+2y)$	**f**.	$(6w-y)(6w+y)$
	g.	$(2a-1)(2a+1)$	**h**.	$(g-9h)(g+9h)$	**i**.	$(7x-y)(7x+y)$
	j.	$(3c-4d)(3c+4d)$	**k**.	$(2p-3q)(2p+3q)$	**l**.	$(b-10c)(b+10c)$
	m.	$(5-4a)(5+4a)$	**n**.	$(2d-11)(2d+11)$	**o**.	$(15-7k)(15+7k)$
	p.	$(3x-0.5)(3x+0.5)$				
Q3.	**a**.	$2(a-b)(a+b)$	**b**.	$5(p-1)(p+1)$	**c**.	$5(3-x)(3+x)$
	d.	$4(d-3)(d+3)$	**e**.	$2(y-5)(y+5)$	**f**.	$4(b-5)(b+5)$
	g.	$3(q-3)(q+3)$	**h**.	$8(a-2)(a+2)$	**i**.	$a(b-8)(b+8)$
	j.	$x(y-5)(y+5)$	**k**.	$ab(c-1)(c+1)$	**l**.	$2(2p-5q)(2p+5q)$
	m.	$2(x-12)(x+12)$	**n**.	$a(k-11)(k+11)$	**o**.	$10(s-0.5)(s+0.5)$
	p.	$\frac{1}{2}(y-30)(y+30)$				
Q4.	**a**.	$(x+1)(x+2)$	**b**.	$(a+1)(x+1)$	**c**.	$(y+4)(y+1)$
	d.	$(c+1)(c+7)$	**e**.	$(x+3)(x+3)$	**f**.	$(b+2)(b+6)$
	g.	$(a+2)(a+7)$	**h**.	$(w+1)(w+9)$	**i**.	$(d+2)(d+5)$
	j.	$(x+3)(x+7)$	**k**.	$(p+4)(p+5)$	**l**.	$(c+4)(c+6)$
	m.	$(s+6)(s+6)$	**n**.	$(x+4)(x+7)$	**o**.	$(y+5)(y+5)$
Q5.	**a**.	$(a-3)(a-5)$	**b**.	$(x-1)(x-8)$	**c**.	$(c-3)(c-6)$
	d.	$(y-2)(y-2)$	**e**.	$(b-1)(b-5)$	**f**.	$(x-1)(x-14)$
	g.	$(c-2)(c-8)$	**h**.	$(x-1)(x-6)$	**i**.	$(y-4)(y-8)$
	j.	$(p-3)(p-8)$	**k**.	$(a-4)(a-9)$	**l**.	$(x-3)(x-12)$
	m.	$(b-1)(b-3)$	**n**.	$(q-1)(q-10)$	**o**.	$(a-3)(a-4)$
Q6.	**a**.	$(b-2)(b+5)$	**b**.	$(x-1)(x+7)$	**c**.	$(y+2)(y-3)$
	d.	$(a+4)(a-5)$	**e**.	$(q-2)(q+4)$	**f**.	$(x+2)(x-10)$
	g.	$(d-3)(d+7)$	**h**.	$(c-3)(c+12)$	**i**.	$(p+3)(p-8)$
	j.	$(y+1)(y-8)$	**k**.	$(a-1)(a+6)$	**l**.	$(x+4)(x-9)$
	m.	$(b+1)(b-5)$	**n**.	$(s-4)(s+6)$	**o**.	$(d-2)(d+8)$
Q7.	**a**.	$(3x+1)(x+2)$	**b**.	$(2a+1)(a+2)$	**c**.	$(3c+5)(c+1)$
	d.	$(2p+9)(p+1)$	**e**.	$(2y+1)(y+5)$	**f**.	$(3d+2)(d+3)$
	g.	$(5q+4)(q+1)$	**h**.	$(2b+1)(2b+3)$	**i**.	$(3x+2)(2x+3)$
	j.	$(3a+5)(a+3)$	**k**.	$(5x+1)(2x+3)$	**l**.	$(3c+1)(3c+1)$
	m.	$(3y+1)(2y+3)$	**n**.	$(3b+2)(b+1)$	**o**.	$(4x+1)(2x+3)$
Q8.	**a**.	$(2x-1)(x-3)$	**b**.	$(2a-3)(a-1)$	**c**.	$(5p-2)(p-3)$
	d.	$(5b-2)(b-1)$	**e**.	$(2x-1)(3x-2)$	**f**.	$(4y-3)(y-2)$
	g.	$(7c-1)(c-4)$	**h**.	$(4m-1)(m-2)$	**i**.	$(2a-1)(8a-1)$
	j.	$(4y-1)(2y-5)$	**k**.	$(3p-1)(p-12)$	**l**.	$(4x-1)(x-6)$
	m.	$(5a-2)(3a-2)$	**n**.	$(6c-1)(4c-3)$	**o**.	$(3b-4)(2b-9)$
Q9.	**a**.	$(3x+1)(x-1)$	**b**.	$(2a-3)(a+1)$	**c**.	$(4p+3)(p-1)$
	d.	$(2c-1)(c+4)$	**e**.	$(6y+1)(y-2)$	**f**.	$(3w-2)(w+4)$
	g.	$(3m+5)(m-1)$	**h**.	$(4q-3)(q+2)$	**i**.	$(3b-4)(2b+5)$
	j.	$(2t+1)(2t-3)$	**k**.	$(6z-1)(2z+3)$	**l**.	$(2d+3)(2d-5)$
	m.	$(7s+1)(s-4)$	**n**.	$(5x-3)(3x+5)$	**o**.	$(9v-2)(4v+1)$

Q10.	**a**.	$3(x-1)(x+1)$	**b**.	$2(p+5)(p+1)$	**c**.	$9(y-2)(y+2)$	
	d.	$5(x+3)(x+2)$	**e**.	$a(x+3)(x+2)$	**f**.	$3(y-5)(y+1)$	
	g.	$3(5c+4)(c+1)$	**h**.	$2(4b+1)(2b+3)$	**i**.	$3(3q+2)(q+3)$	
	j.	$5(2s-1)(s-3)$	**k**.	$4(2m-3)(m-1)$	**l**.	$4(2a-3)(a-3)$	
	m.	$2(2t-7)(t+4)$	**n**.	$10(3d+2)(3d-4)$	**o**.	$4(10x-1)(10x+1)$	

The Circle ~ Arcs & Sectors

Q1.	**a**.	7.85 cm	**b**.	4.71 cm	**c**.	18.85 cm	**d**. 3.14 cm
	e.	4.89 cm	**f**.	16.76 cm	**g**.	20.94 cm	**h**. 12.57 cm
Q2.	**a**.	19.63 cm^2	**b**.	7.07 cm^2	**c**.	84.92 cm^2	**d**. 9.42 cm^2
	e.	4.89 cm^2	**f**.	100.53 cm^2	**g**.	83.78 cm^2	**h**. 62.83 cm^2
Q3.	22 cm		**Q4**.	90^o	**Q5**.	25.12 cm^2	

The Circle ~ Symmetry & Chords

Q1.	**a**.	90^o	**b**.	45^o	**c**.	90^o	**d**. 55^o
	e.	90^o	**f**.	43^o	**g**.	90^o	**h**. 18^o
	i.	90^o	**j**.	63^o	**k**.	90^o	**l**. 78^o
Q2.	**a**.	9.9 cm	**b**.	8.5 cm	**c**.	6.4 cm	**d**. 9.2 cm
Q3.	**a**.	40^o	**b**.	40^o	**c**.	50^o	**d**. 33^o
	e.	33^o	**f**.	57^o	**g**.	28^o	**h**. 62^o
	i.	62^o	**j**.	118^o	**k**.	118^o	**l**. 31^o
	m.	31^o	**n**.	31^o	**o**.	31^o	
Q4.	**a**.	4.5 cm	**b**.	5.7 cm	**c**.	7.2 cm	**d**. 3 cm
	e.	8 cm	**f**.	9.2 cm			
Q5.	**a**.	36.9^o	**b**.	24.1 cm	**c**.	9.0 cm	**d**. 12.6 cm
	e.	23.7 cm	**f**.	8 cm	**Q6**.	37.6 cm	

The Circle ~ Tangents & Angles

Q1.	**a**.	90^o	**b**.	20^o	**c**.	110^o	**d**. 90^o
	e.	60^o	**f**.	30^o	**g**.	35^o	**h**. 35^o
	k.	90^o	**m**.	65^o	**n**.	90^o	**p**. 55^o
	q.	90^o	**r**.	45^o			
Q2.	**a**.	6 cm	**b**.	13 cm	**c**.	24 cm	
Q3.	**a**.	33.7^o	**b**.	10.4 cm	**c**.	14.3 cm	