



Easy Going
Mathematics (Higher)

YEAR 11

BOOK 1

New specification

YEAR 11

(9 - 1)

Practice book

9 - 1

M.NAT

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M.Nat

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GCSE (9 – 1)

Mathematics

Higher

YEAR 11

Practice questions

BOOK 1

M. Nat

LEC Publications

Edexcel & AQA new syllabus at a glance

(as specified by Edexcel's & AQA's official site)

The assessments will cover the following content headings:

- 1: Number
- 2: Algebra
- 3: Ratio, proportion and rates of change
- 4: Geometry and measures
- 5: Probability
- 6: Statistics

An overview of the structure:

- Two tiers are available: Foundation and Higher (content is defined for each tier).
- Each student is permitted to take assessments in either the Foundation or Higher tier.
- The qualification consists of three equally-weighted written examination papers at either Foundation or Higher tier.
- All three papers must be at the same tier of entry and must be completed in the same assessment series.
- The content outlined for each tier will be assessed across all three papers.
- Each paper has a range of question types; some questions will be set in both mathematical and non-mathematical contexts.
- Two assessment series available per year: May/June and November.
- First assessment series: May/June 2017.
- The qualification will be graded and certificated on a nine-grade scale from 9 to 1 using the total mark across all three papers where 9 is the highest grade.
- Foundation tier: grades 1 to 5.
- Higher tier: grades 4 to 9 (grade 3 allowed).

The assessment:

In all three papers there are a mix of question styles, from short, single-marked questions to multi-step problems.

The mathematical demand increases as the student progresses through the paper.

The information below is the same for both Foundation and Higher tiers.

Paper 1: Non - calculator

- Written exam: 1 hour 30 minutes
- 80 marks
- Non - calculator
- $33\frac{1}{3}\%$ of the GCSE Mathematics assessment

Paper 2: Calculator

- Written exam: 1 hour 30 minutes
- 80 marks
- Calculator allowed
- $33\frac{1}{3}\%$ of the GCSE Mathematics assessment

Paper 3: Calculator

- Written exam: 1 hour 30 minutes
- 80 marks
- Calculator allowed
- $33\frac{1}{3}\%$ of the GCSE Mathematics assessment

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Exercise 1A

Mixed numbers

Q1 List all the six factors of 18.

Q2 Find the LCM of the following numbers.

a) 12, 24, 8 _____

b) 12, 36, 24 _____

c) 25, 5, 45 _____

Q3 Write down all the even numbers from this list.

46, 32, 33, 44, 25, 205, 202, 1002, 1001

Q4 Write down the next two even numbers after:

a) 13 _____

b) 22 _____

c) 298 _____

Q5 Write down three multiples of 5 that are larger than 25.

Q6 Find the two prime numbers that are between 20 and 30.

Q7 Find the next prime number after 101.

Q8 Find all the prime factors of the following numbers.

a) 32 _____

b) 40 _____

c) 125 _____

Q9 Write these numbers as products of their prime factors.

a) 45 _____

b) 82 _____

c) 75 _____

d) 39 _____

Q10 Find the highest common factor of:

a) 21 and 35 _____ b) 16 and 24 _____

c) 35 and 45 _____ d) 42 and 84 _____

Q11 Find the lowest common multiple of:

a) 2 and 3 _____ b) 18 and 24 _____

c) 6 and 18 _____ d) 25 and 75 _____

Q12 Peter writes down the numbers from 3 to 40. He crosses out all the multiples of 2. He crosses out all the multiples of 3 and then all the multiples of 5.

a) Which numbers are crossed out more than once?

b) Which numbers have not been crossed out at all?

Exercise 1B

Harder questions

Q1 Calculate the answer to the following questions.

a) Express 104 as the product of its prime factors.

b) Find the highest common factor of 104 and 24.

Q2 Calculate the answer to the following questions.

a) Find the highest common factor of the numbers 16 and 40.

- b) The number 40 expressed as the product of its prime factors, in index form, is given by $2^3 \times 5$. Express 90 as the product of its prime factors in index form.

- c) Use your answer to *b*) to write 40×90 as the product of its prime factors in index form. Simplify your answer.

Q3 Calculate the answer to the following questions.

- a) Write 180 as the product of its prime factors in index form.

- b) Write 1200 as a product of prime numbers in index form.

- c) Write down the smallest factor of 1200 which is a perfect square.

Q4 Calculate the answer to the following questions.

- a) Write 800 as a product of prime numbers in index form.

- b) Write down the multiple of 800 which is a perfect square.

- c) Express 1500 as a product of prime numbers in index form.

Q5

Express 400 as a product of prime numbers in index form.

Exercise 2A

Multiplication & Division

Q1 Multiply the following fractions.

a) $\frac{3}{14} \times \frac{7}{12}$ _____

b) $\frac{5}{14} \times \frac{4}{12}$ _____

Q2 Divide the following fractions.

a) $\frac{3}{14} \div \frac{7}{12}$ _____

b) $\frac{4}{14} \div \frac{6}{12}$ _____

Q3 Work out the answers by either increasing or decreasing the following numbers by the fractions given.

a) increase 35 by $\frac{2}{7}$

b) decrease 40 by $\frac{2}{5}$

c) increase 56 by $\frac{3}{7}$

Q4 Write the first as a fraction of the second (give the answer in the simplified form).

a) 50km, 120km

b) 55mm, 125mm

c) 20mm, 40cm

d) 80km, 140km

e) 65mm, 180mm

f) 40mm, 180cm

Exercise 2B**Decimals****Q1** Place the following decimals in ascending order.

a) 2.007, 3.108, 4.068 _____

b) 0.78, 0.38, 0.068, 0.278 _____

Q2 Round each of these decimal numbers to

(i) 1d.p. (ii) 2 d.p. (iii) 3 d.p.

a) 0.6814 (i) _____ (ii) _____ (iii) _____

b) 7.51491 (i) _____ (ii) _____ (iii) _____

Q3 Round each of these numbers to

(i) 1 s.f. (ii) 2 s.f. (iii) 3 s.f.

a) 0.60025 (i) _____ (ii) _____ (iii) _____

b) 3.45265 (i) _____ (ii) _____ (iii) _____

c) 0.73464 (i) _____ (ii) _____ (iii) _____

d) 315.47 (i) _____ (ii) _____ (iii) _____

e) 6502.56 (i) _____ (ii) _____ (iii) _____

Q4 Find an estimated answer to each of the following.

a)
$$\frac{370 \times 2.85}{5.8 \times 3.9}$$

b)
$$\frac{55 \times 18}{33 \times 25}$$

c)
$$\frac{4855 \times 4.7 \times 7.9}{474 \times 5.1 \times 18.3}$$

d)
$$\frac{121}{6 \times 16.4}$$

e)
$$\frac{31.3 \times 702.4}{5.92 \times 18.3}$$

Q5 For each measurement write down:

i) the minimum,

ii) the maximum, possible value.

- | | | |
|------------|----------|-----------|
| a) 42cm | i) _____ | ii) _____ |
| b) 38km | i) _____ | ii) _____ |
| c) 2.4mm | i) _____ | ii) _____ |
| d) 1.488kg | i) _____ | ii) _____ |
| e) 93km | i) _____ | ii) _____ |

Q6 The fastest lap times (in seconds) of six runners are shown in the table below..

Write down the runners' times in order. start with the fastest.

Peter	Rose	Mary	Meha	Suhan	Meena
42.782	54.320	41.685	53.072	35.605	53.702

Exercise 2C

Decimals

Q1 Work out the square of the following questions.

a) 7.4 _____ b) 21.2 _____

c) 6.02 _____ d) 5.8 _____

Q2 Nine people share £146.70 equally. How much does each person get?

Q3 India won 220 medals in Olympic games. Write this number to one significant figure (1s.f.).

Q4 Work out an estimate for the total cost of 35 books costing £9.98 each?

Q5 A book costs £5.25. Work out the cost of buying nine books.

Q6 Using the information $87 \times 121 = 10527$

Write down the value of

a) 8.7×12.1 _____

b) 0.87×121000 _____

c) $10.527 \div 8.7$ _____

Q7 Using the information $6.72 \times 550 = 3696$

Write down the value of

a) 6.72×55 _____

b) 6.72×5.5 _____

c) 0.672×0.55 _____

Exercise 3A

Q1 Simplify:

a) $6 : 32$ _____ b) $125 : 1200$ _____

c) $625 : 225$ _____ d) $300\text{m} : 1.4\text{km}$ _____

Q2 Express these ratios in the form $1 : n$.

a) $3\text{mm} : 3\text{m}$ _____ b) $4.8\text{kg} : 300\text{g}$ _____

c) $4 : 1$ _____ d) $2 : 8$ _____

Q3 Find the missing number in each question.

a) $3 : 1 = x : 5$ _____ b) $1 : 2 = x : 5$ _____

c) $3 : 6 = x : 3$ _____ d) $5 : 3 = x : 15$ _____

Q4 Two rulers are in the ratio $1:7$. The smaller length is 56cm . Find the larger length.

Q5 The total Number of people stayed in a small hotel and a big hotel had a ratio of $9 : 15$. 36 people stayed in the small hotel. How many people stayed in the big hotel?

Exercise 4A

Simple Interest

Q1 Answer the following questions, which are simple interest.

- a) £1800 is deposited in a bank paying 4% simple interest per annum. How much interest will have been paid for the 4 years?

- b) £800 is deposited in a bank paying 0.25% simple interest per annum. How much interest will have been paid for the 5 years?

- c) £2500 is deposited in a bank paying 2.25% simple interest per annum. How much interest will have been paid for the 10 years?

- d) £10000 is deposited in a bank paying 2.5% simple interest per annum. How much interest will have been paid for the 10 years?

- e) £4400 is deposited in a bank paying 1.5% simple interest per annum. How much interest will have been paid for the 11 years?

Exercise 4B**Compound Interest**

Q1 Answer the following questions, which are compound interest.

- a) £4400 is deposited in a bank paying 2% compound interest per annum. What is the balance after 10 years?

- b) £10000 is deposited in a bank paying 5% compound interest per annum. What is the balance after 4 years?

- c) £200 is deposited in a bank paying 3% compound interest per annum. What is the balance after 7 years?

- d) £2600 is deposited in a bank paying 2.75% compound interest per annum. What is the balance after 4 years?

Exercise 4C

Percentage increase & decrease

Q1 Answer the following questions.

a) Increase 180 by 110%

b) Decrease 200 by 85%

c) Decrease 160 by 10%

d) Decrease 180 by 40%

e) Increase 520 by 10%

f) Decrease 580 by 25%

g) Decrease 80 by 20%

h) Increase 800 by 40%

i) Increase 190 by 20%

j) Increase 120 by 20%

k) Decrease 60 by 90%

l) Increase 100 by 105%

m) Decrease 180 by 30%

n) Increase 200 by 80%

o) Decrease 580 by 75%

p) Increase 140 by 50%

q) Decrease 120 by 65%

r) Increase 280 by 60%

Exercise 5A

Indices

Q1 Simplify the following indices

a) $7^4 \times 7^6$

b) $5^{-3} \times 5^5$

c) $9^4 \times 9^{-6}$

d) $\frac{3^3 \times 3^6}{3^5}$

e) $5^{-3} \times 5^4$

f) $\frac{(8^4)^2 \times 8^{-3}}{(8^2)^4}$

g) $\frac{(2^2)^4 \times (2^{-2})^4}{2^4}$

h) $\frac{a^6 \times b^3 \times a^{-3}}{(ab)^5}$

i) $\frac{(ab)^5 \times (a^3b)^3}{(ab)^4}$

j) $\frac{(5^3)^4 \times (5^3)^5}{5^4}$

k) $\frac{p^7 \times q^3 \times p^{-2}}{(pq)^2}$

l) $\frac{(6)^4 \times (36)^2}{(6)^3}$

m) $\frac{(4^2)^4 \times (4^{-2})^4 \times 64}{4^4}$

n) $\frac{p^5 \times p^7 \times p^{-2}}{(p)^6}$

o) $\frac{(9)^2 \times (81)^2}{(9)^6}$

Exercise 5B**Surds****Q1** Simplify the following surds.

a) $\sqrt{8}$

b) $\sqrt{27}$

c) $\sqrt{18}$

d) $\sqrt{50}$

e) $\sqrt{84}$

f) $\sqrt{72}$

g) $\sqrt{64}$

h) $\sqrt{8} + \sqrt{28}$

i) $2\sqrt{3}(6 - \sqrt{3})$

j) $\sqrt{27} - 2\sqrt{3}$

k) $5 + 5\sqrt{25}$

l) $\sqrt{12} - 2\sqrt{3}$

m) $3\sqrt{3}(12 - 2\sqrt{3})$

n) $2\sqrt{2}(7 - 3\sqrt{2})$

o) $2\sqrt{6}(\sqrt{6} - 3\sqrt{6})$

Q2 Rationalise the following.

a) $\frac{1}{\sqrt{3}}$

b) $\frac{1}{\sqrt{6}}$

c) $\frac{2}{\sqrt{3}}$

d) $\frac{1}{2\sqrt{3}}$

e) $\frac{5}{2\sqrt{6}}$

f) $\frac{1}{3\sqrt{5}}$

g) $\frac{1}{5\sqrt{5}}$

h) $\frac{3}{7\sqrt{3}}$

Q3 Rationalise the following question

a) $\frac{3-2\sqrt{5}}{2+\sqrt{5}}$ _____

b) $\frac{2+3\sqrt{3}}{1-2\sqrt{3}}$ _____

c) $\frac{2+\sqrt{3}}{3+\sqrt{3}}$ _____

d) $\frac{7-\sqrt{5}}{7+\sqrt{5}}$ _____

e) $\frac{3-\sqrt{3}}{4-\sqrt{3}}$ _____

f) $\frac{3}{2-\sqrt{3}}$ _____

Q4 Evaluate the following

a) $121^{\frac{1}{2}}$ _____

b) $\left(\frac{16}{25}\right)^{\frac{1}{2}}$ _____

c) $64^{\frac{1}{3}}$ _____

d) $\left(\frac{1}{9}\right)^{-\frac{3}{2}}$ _____

e) $\left(\frac{125}{27}\right)^{-\frac{2}{3}}$ _____

f) $\left(\frac{64}{27}\right)^{\frac{1}{3}}$ _____

g) $25^{\frac{1}{2}}$ _____

h) $\left(\frac{81}{64}\right)^{\frac{1}{4}} \times \frac{2^3}{6}$ _____

i) $0.36^{\frac{1}{2}}$ _____

j) $\left(\frac{100}{9}\right)^{\frac{1}{2}}$ _____

k) $\frac{225^{\frac{1}{2}}}{144^{\frac{1}{2}}}$ _____

l) $121^{\frac{3}{2}}$ _____

m) $\frac{5^{\frac{1}{2}} \times 5^0 \times 25^{\frac{1}{2}}}{125^{\frac{1}{3}}}$

n) $\frac{(25^{\frac{1}{2}} \times 100^{\frac{1}{2}})}{25^0}$

o) $\frac{144^{\frac{1}{2}} \times 225^{\frac{1}{2}}}{625^{\frac{1}{4}}}$

p) $576^{\frac{1}{2}} \times 729^{\frac{1}{2}}$

q) $100^{\frac{1}{2}} \times 343^{\frac{1}{3}}$

r) $512^{\frac{1}{9}} \times 216^{\frac{1}{3}}$

Exercise 6A

Converting numbers

Q1 Change the following numbers into standard form.

- | | | | | | |
|-------------|-------|-------------|-------|------------|-------|
| a) 96 | _____ | b) 56.3 | _____ | c) 0.0078 | _____ |
| d) 3076 | _____ | e) 40.766 | _____ | f) 0.0363 | _____ |
| g) 0.00012 | _____ | h) 13778 | _____ | i) 0.12898 | _____ |
| j) 0.02485 | _____ | k) 726.99 | _____ | l) 0.00023 | _____ |
| m) 0.00009 | _____ | n) 70.98 | _____ | o) 0.0009 | _____ |
| p) 2367.009 | _____ | q) 0.000756 | _____ | r) 6675 | _____ |
| s) 0.0997 | _____ | t) 0.8986 | _____ | | |

Q2 Change the following numbers into ordinary numbers.

- | | | | |
|--|-------|---|-------|
| a) 8×10^2 | _____ | b) 9×10^{-3} | _____ |
| c) 6×10^{-4} | _____ | d) $3 \times 10^2 \times 7 \times 10^2$ | _____ |
| e) $4 \times 10^2 + 6 \times 10^3$ | _____ | f) $6 \times 10^{-2} + 4 \times 10^3$ | _____ |
| g) $(4 \times 10^4) \div (2 \times 10^{-2})$ | _____ | h) $18 \times 10^7 - 3 \times 10^2$ | _____ |
| i) $8 \times 10^4 - 4 \times 10^4$ | _____ | | |
| j) $37 \times 10^3 \times 4 \times 10^4$ | _____ | | |

Q1 Word question on standard form:

a) Work out $4 \times 10^7 \times 6 \times 10^{-5}$, give your answer in standard form.

b) Workout Give your answer in standard form.

c) Work out 112×10^7 , give your answer in standard form.

d) Calculate the value of the following, giving your answers in standard form.

$$p = 8 \times 10^3 \quad q = 2 \times 10^4$$

i) pq

ii) $p + q$

iii) $p \div q$

- e) Last year the population of the UK was approximately (4×10^5) .
An average of £680 per person was spent on food last year in the UK.

What was the total amount spent on food last year in the UK?

Give your answers in standard form.

- f) A rectangular picture measures 1.2×10^2 cm by 4.3×10^3 cm.
Calculate the following, giving your answer in standard form.

Remember to state the units with your answers.

- i) the perimeter of the picture
ii) the area of the picture

- g) It is estimated that a water tank contains about 1.12×10^7 drops of rain water. By taking samples, it is further estimated that the water contains about 5.8×10^9 microbes. Assuming an even distribution give an estimate of the number of microbes per drop of rain water. Give your answer in standard form (3 s.f.).

h) If $p = 2.82 \times 10^6$ and $q = 13.3 \times 10^{-3}$. Find in standard form.

i) pq

ii) $p \div q$

iii) $2p \times 6q$

iv) $p^2 \div q$

i) If the area of an adult playground is $4.2 \times 10^5 \text{ m}^2$, and the area of the children playground is $1.4 \times 10^3 \text{ m}^2$.

Find:

i) their combined area in m^2

ii) the size of the adult playground as an ordinary number.

iii) the number of times bigger that the adult playground is compared to children playground.

Exercise 7A

Substitution

Q1 Use $a = 3$, $b = -4$, $c = 5$ and $d = 2$ to calculate the value of the following questions

a) $a^2 b$

b) $2ab - cd$

c) $3a^2b - cd$

d) $7(a + d)$

e) $2(ab - cb)$

f) $a^3c - b^3d + ac$

Q2 Use $a = 4$, $b = -6$, $c = 2$ and $d = -3$ to calculate the value of the following questions

a) $\frac{ab + cd}{ab - cd}$

b) $\frac{a^2b - c^2}{cd^2}$

c) $\frac{a^3b - c^2}{cd^2}$

d) $\frac{a^3 - b^3}{ab}$

e) $\frac{a^3 + b}{c^2d}$

f) $\frac{ab - a^2c}{c^2d}$

g) $\frac{abc}{a^2 + b^2}$

h) $\frac{a^3c - b^2}{cd}$

i) $\frac{c^2d}{a^3 - d^2}$

Q3

Substitute the given values and find the answers.

- a) For the equation $y = a^2b - c$, find the value of y when $a = 2$, $b = -3$ and $c = 7$

- b) For the equation $s = ut + \frac{1}{2}at^2$, find the value of s when $u = 0$, $t = 3$ and $a = 4$.

- c) For the equation: $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$ find the value of f when $v = 5$ and $u = -3$

- d) For the equation $E = mgh$, Find the value of h when $E = 60$, $m = 4$ and $g = 12$.

- e) For the equation $E = \frac{1}{2}mv^2$, Find the value of m when $E = 225$ and $v = 5$.

- f) For the equation $y = \frac{1}{2}(P + Q)$, find the value of Q when $y = 12$ and $P = 4$.

- g) For the equation $E = mgh + \frac{1}{2}mv^2$, find the value of E when $m = 4$, $g = 12$, $h = 6$ and $v = 4$.

Exercise 7B**Expanding Brackets****Q1** Multiply out the brackets and simplify your answers.

a) $3(x - 5)$

b) $2(x - 6)$

c) $-5(a + b)$

d) $-4(a - 2)$

e) $2a(a - 2)$

f) $a(a - 3)$

g) $7(2x - 5)$

h) $6(b - xy)$

i) $10(-2a + 8)$

Q2 Multiply out the brackets and simplify your answers.

a) $2(a + 2) + 3(a + 5)$

b) $7(2a - 7) - 6(a - 2)$

c) $7(a + 5) - 2(a + 4)$

d) $6(a - 4) - 7(a + 3)$

e) $7 - 3(x - 2)$

f) $-4(a - b) + 3(a + b)$

g) $x(2 - 4x) + x(2x + 3)$

h) $7(2a - 8) - 3(a + 8)$

i) $4x + x(2 + x) - 3x^2$

j) $3y - y(y - 4)$

k) $4a + 3a(7a - 5)$

l) $4y - 2x(2 - y) - 2xy$

m) $4(x - 4) - 4(x - 6)$

n) $x^3(2x - 4)$

o) $7x(2x - 3) - x^2$

Q3 Multiply out the brackets and simplify your answers.

a) $(2a - 5)(4a - 3)$

b) $(2x - 5)(x - 7)$

c) $(2a - 5)(a - 5)$

d) $(2a - 5)(3a - 5)$

e) $(8a - 5)(3a - 5)$

f) $(4a - 5)(2a + 5)$

g) $(2a + 5)(3a - 5)$

h) $(6x - 5y)(2x - y)$

i) $(4x - 3y)(7x - y)$

j) $(5x - y)(5x - y)$

k) $(4y - 6)(2x - 3)$

l) $(2a - b)(a - b)$

m) $(2 - x)(5 - x)$

n) $(2a - 4)(5a - 1)$

o) $(6x - 4)(-x + 2)$

Q4 Expand the followings and give your answer in simplified form.

a) $(x + 6)^2$

b) $(x - 8)^2$

c) $(2x - 5)^2$

d) $(2y - 7)^2$

e) $(3y + 3)^2$

f) $(7a - 1)^2$

g) $(2a - b)^2$

h) $(5p - 3)^2$

i) $(8x - 7)^2$

j) $(8a - 3)^2$

k) $(7x - 3)^2$

l) $(4x - 7)^2$

m) $(9x - 5)^2$

n) $(4x - 7)^2$

o) $(4x - 7)^2$

p) $(3x - 5)^2$

q) $(7x - 5)^2$

r) $(x - 9)^2$

s) $(11x - 5)^2$

t) $(10x - 7)^2$

u) $(11x - 7)^2$

Exercise 7C**Common Factors****Q1** Factorise the following expressions

a) $2x + 6$

b) $7x - 7$

c) $4x - 16$

d) $ay + ayz$

e) $12x + 44$

f) $17x - 68$

g) $x^2yz + xyz$

h) $13x - 26$

i) $x^2z + yz^2$

j) $4x - 28$

k) $3x^2 - 18y$

l) $3x + 81$

m) $16x - 64$

n) $-27x + 54$

o) $3x^4 - x^3$

Q2 Factorise the following expressions

a) $x^3y + xy^3 - 2xyz$

b) $9x^3 - 12x + x^4$

c) $7x^2yz - 2y^2x + 3xy^2z$

d) $12x^4 + 24x^2 + 144x^3$

Q3 Factorise the following questions by grouping into two

a) $4x^3 - 16x^2 + x - 4$

b) $3x^3 - 9x^2 + 3x - 9$

c) $10y^3 - 15y^2 + 12y - 18$

d) $2x^3 + 4x^2 + x + 2$

e) $2a^3 - 4a^2 + 10a - 20$

f) $8y^3 + 20y^2 + 10y + 25$

Q4 Factorise the following questions.

a) $12p^3 + 8p^2 + 9p + 6$

h) $16x^3 - 20x^2 + 12x - 15$

b) $x^3 - 4x^2 + 5x - 20$

i) $3y^3 + 12y^2 + 4y + 16$

c) $15x^3 - 25x^2 + 12x - 20$

j) $3x^3 - 15x^2 + 5x - 25$

d) $y^3 + y^2 + 2y + 2$

k) $4p^3 - 4p^2 + 3p - 3$

Exercise 7D**Quadratic Factors****Q1** Factorise the following quadratic equations.

a) $x^2 + 6x + 8$

b) $x^2 + 12x + 32$

c) $x^2 + 14x + 24$

d) $x^2 + 22x + 40$

e) $x^2 - 9x + 18$

f) $x^2 + 5x + 4$

g) $x^2 - 7x + 6$

h) $x^2 - 15x + 14$

i) $x^2 + 4x + 3$

j) $x^2 - 12x + 20$

k) $x^2 - 13x + 36$

l) $x^2 - 16x + 55$

m) $x^2 - 11x + 18$

n) $x^2 - 18x + 72$

o) $x^2 - 13x + 12$

p) $x^2 - 17x + 60$

Q2 Factorise the following quadratic equations.

a) $x^2 - 11x - 26$

e) $x^2 - 8x - 65$

b) $x^2 - 2x - 48$

f) $y^2 - 9y - 36$

c) $p^2 - 5p - 36$

g) $P^2 - 7P - 78$

d) $a^4 - 4a^2 - 117$

h) $P^2 - 6P - 72$

Q3 Factorise the following quadratic equation

a) $4x^2 + 8x - 140$

e) $7x^2 - 45x - 28$

b) $2x^2 - 18x + 36$

f) $2n^2 - 2n - 84$

c) $5y^2 + 25y - 70$

g) $3a^2 + 12a - 63$

d) $yx^2 - 12xy + 27y$

h) $yx^2 - 6yx - 7y$

Q4 Factorise the following quadratic equation

a) $28n^4 + 16n^3 - 80n^2$

h) $3b^3 - 5b^2 + 2b$

b) $30a^2b - 87ab + 30b$

i) $9x^2y + 73xy + 70y$

c) $4a^3 + 43a^2 + 30a$

j) $3y^3 + 21y^2 + 36y$

d) $3y^2 - 48y + 189$

k) $5p^2 - 25p - 70$

e) $2x^2 - 7x + 3$

l) $5x^2 - 11x + 2$

f) $9x^2 - 15x + 6$

m) $12x^2 - 6x - 6$

g) $7x^2 - 19x - 6$

n) $18x^2 - 21x + 6$

Exercise 7E**Difference of two squares****Q1** Factorise the difference of squares.

a) $x^2 - 16$

b) $3x^2 - 27$

c) $36x^2 - 9y^2$

d) $1 - 25x^2$

e) $2p^2 - 128$

f) $x^2 - 1^2$

g) $-81 + x^2$

h) $2m^2 - 50k^2$

i) $y^2 - 25$

j) $14x - 42x^2$

k) $x^6 - 64$

l) $x^4 - 121$

m) $(x^2)^4 - 1$

n) $x^2 - 225$

o) $4y^2 - 64$

d) $225 - y^2$

Q2 Factorise the difference of squares

a) $8x^2 - 72$

b) $pq^3 - p^3q$

c) $5p^4q^5 - 5q^5$

d) $3(x - y)^2 - 12$

e) $9(x - 1)^2 - 16(x + 2)^2$

f) $49 - 64y^2$

g) $x^2y^2 - w^2z^2$

h) $x^2y^2 - 4$

i) $64x - x^3$

j) $32x^2y - 50y^3$

k) $(x - 2)^2 - 49$

l) $2a^3b - 8ab^3$

m) $2x^2 - 450$

n) $81x^6y^4z^2 - 16$

o) $100x^6 - 100$

p) $25x^4 - 1$

Exercise 7F**Changing the subject of a formula****Q1** Make the term in the brackets as the subject of the formula.

a) $f = ma$ (m)

g) $ax - y = t$ (x)

b) $x(y + x) = c$ (y)

h) $ax - e = b$ (x)

c) $a(x^2 - b) = c$ (x)

i) $9a - b = 8$ (a)

d) $bx + 2 = a - c$ (x)

j) $2a + 5x = b$ (a)

e) $ax + t = b + 2t$ (t)

k) $2x + 3y = 4y^2 + 5x$ (x)

f) $a = 2b + t$ (t)

Q2 Make the term in the brackets as the subject of the formula.

a) $b(c + x) = a$ (x)

e) $x - a = b + c$ (x)

b) $x + a = b + d$ (x)

f) $fx + t = a^2$ (x)

c) $t + 5y = 3$ (y)

g) $s = ut + 1/2(at^2)$ (u)

d) $a(x + c) = b^2$ (x)

Q3 Make the term in the brackets as the subject of the formulae.

a) $x + \frac{x}{100} = y$ (x)

b) $\frac{m^2}{n^2} = \frac{a^2}{x}$ (x)

c) $\frac{x}{a + b} = c + b$ (x)

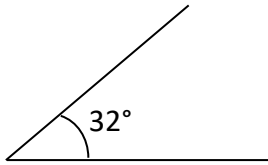
d) $\frac{a}{x} = \frac{x}{c}$ (x)

Exercise 8A

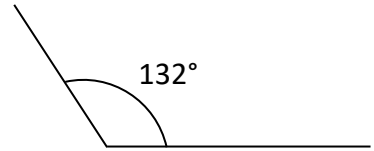
Introduction to Angles, triangles and parallel lines

Q1 Name the following angles.

a)

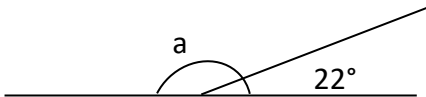


b)

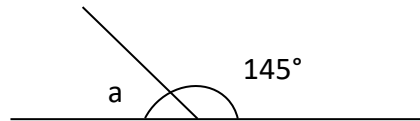


Q2 Find the unknown angles.

a)

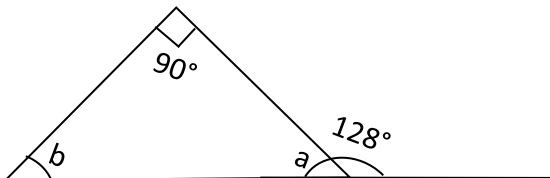


b)

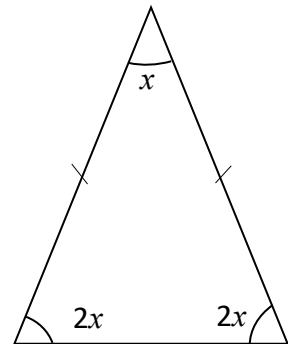


Q3 Find the unknown angles.

a)



b)

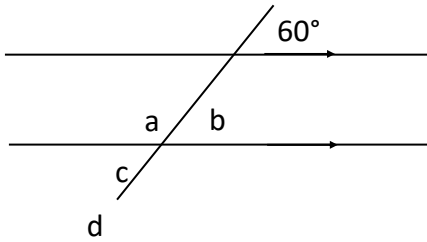


Exercise 8B

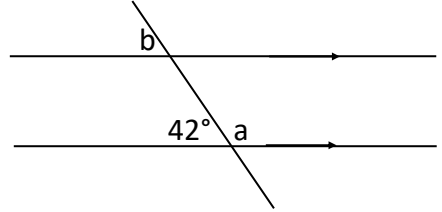
Parallel line calculations

Q1 Find the unknown angles.

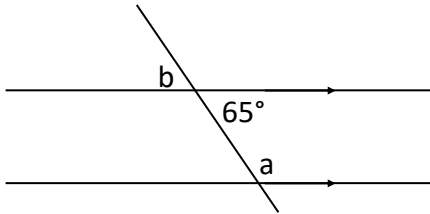
a)



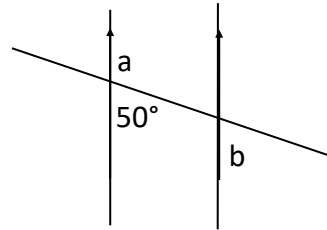
b)



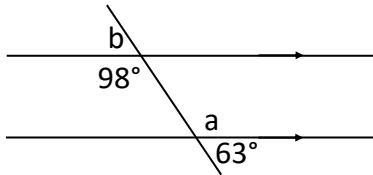
c)



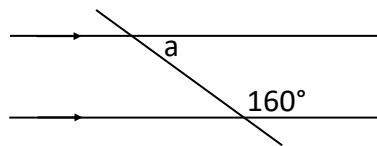
d)



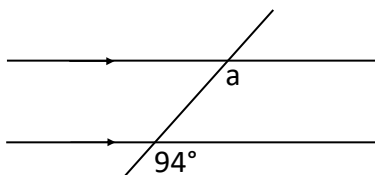
i)



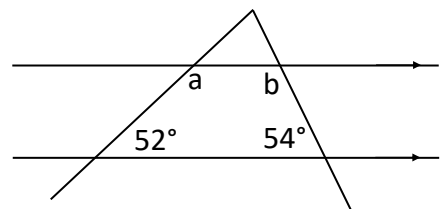
j)



k)



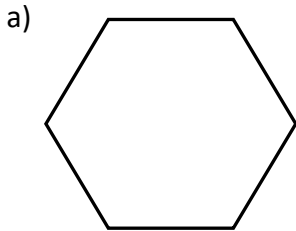
l)



Exercise 9A

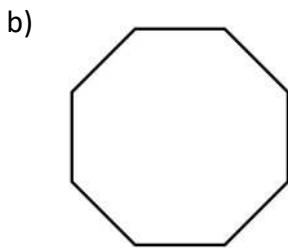
Polygons

Q1 Find the interior angle for each of the regular polygon. Round the answer to the nearest tenths if necessary.



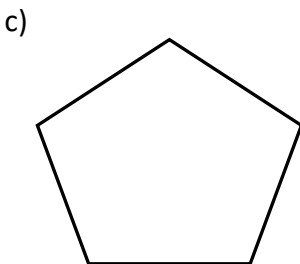
i) What is the sum of the interior angles?

ii) What is the size of each interior angle?



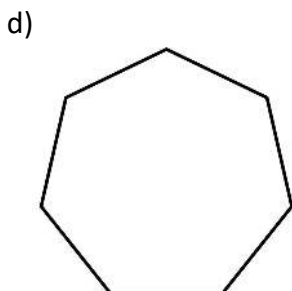
i) What is the sum of the interior angles?

ii) What is the size of each interior angle?



i) What is the sum of the interior angles?

ii) What is the size of each interior angle?



i) What is the sum of the interior angles?

ii) What is the size of each interior angle?

e) For a regular 13 sided polygon;

i) what is the sum of the interior angle

ii) the size of each interior angle

f) For a regular 11 sided polygon;

i) what is the sum of the interior angle

ii) the size of each interior angle

g) For a regular 15 sided polygon;

i) what is the sum of the interior angle

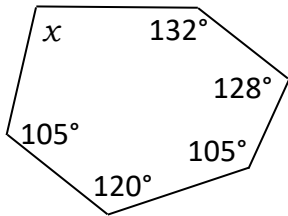
ii) the size of each interior angle

Exercise 9B

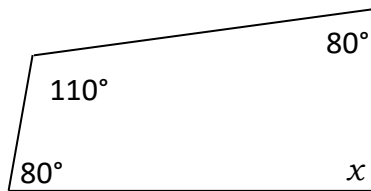
Finding the Unknown angles

Q1 Find the unknown angles.

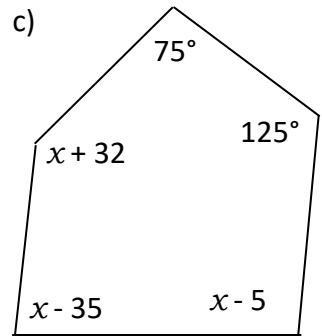
a)



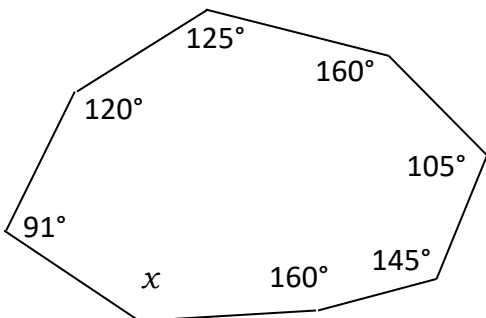
b)



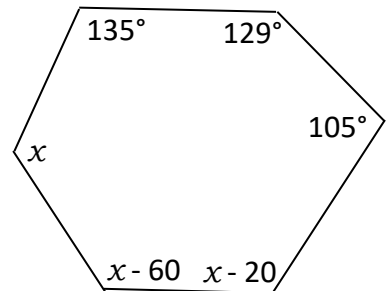
c)

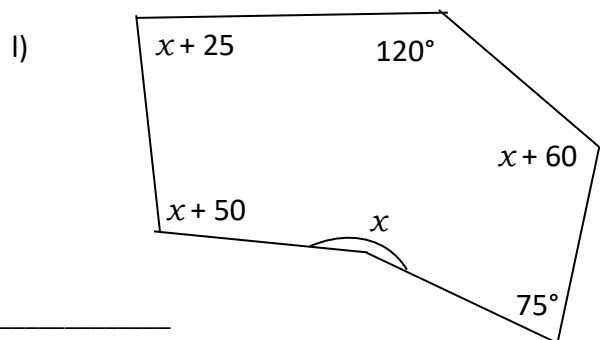
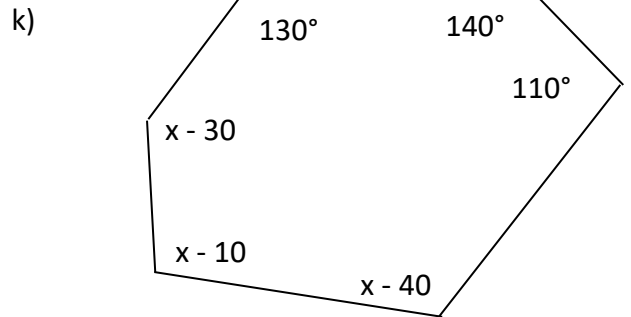
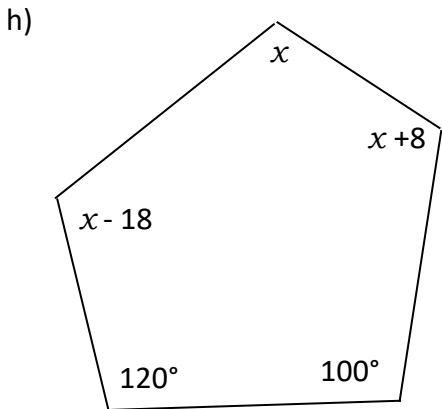
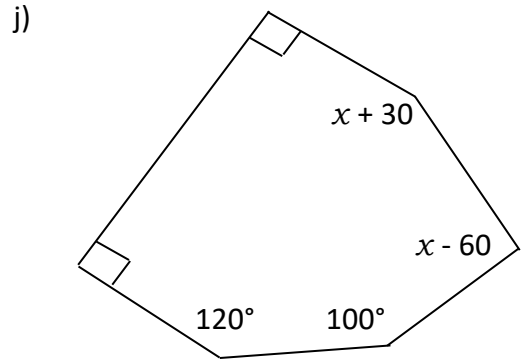
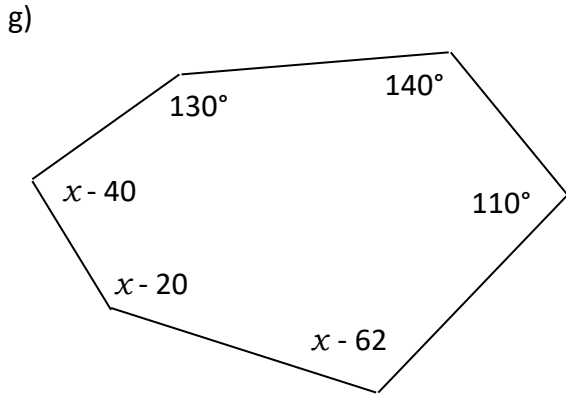
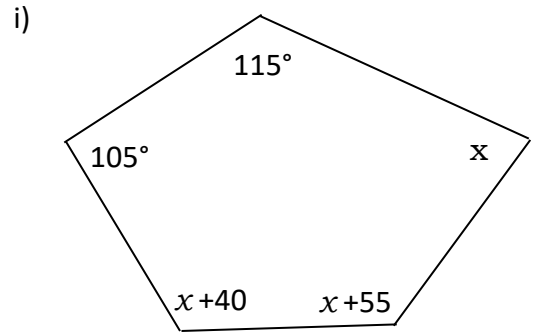
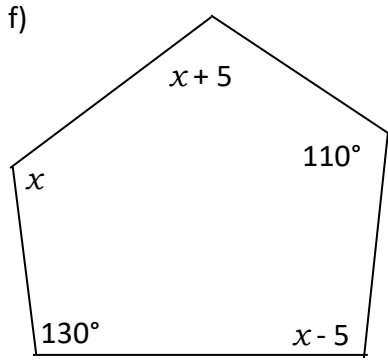


d)



e)



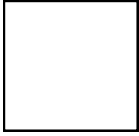


Exercise 10A

Identifying Quadrilaterals

Q1 Write the name of each of the following quadrilateral.

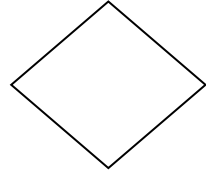
a)



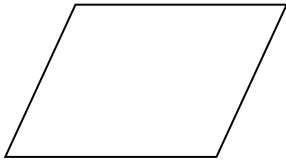
b)



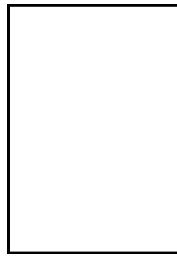
c)



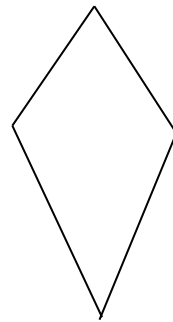
d)



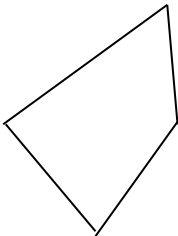
e)



f)



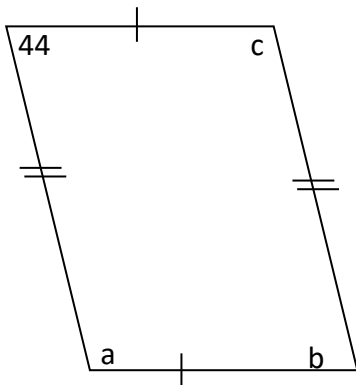
g)



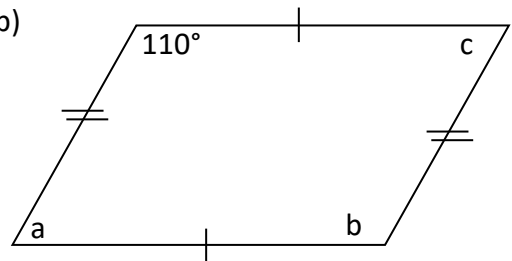
Exercise 10B

Q1 Find the missing angles in each parallelogram

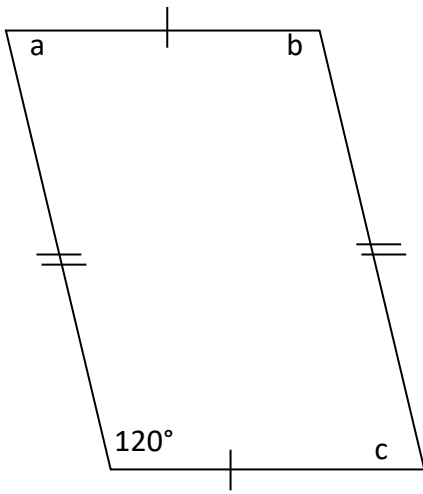
a)



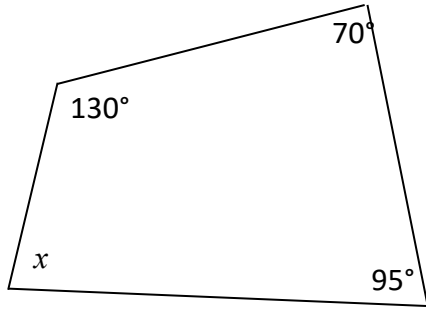
b)



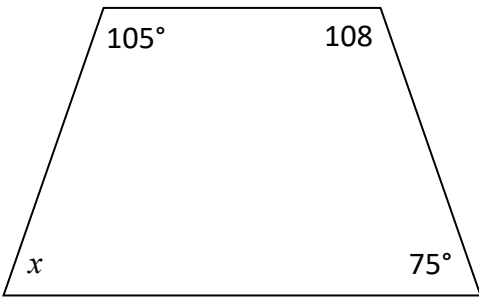
c)



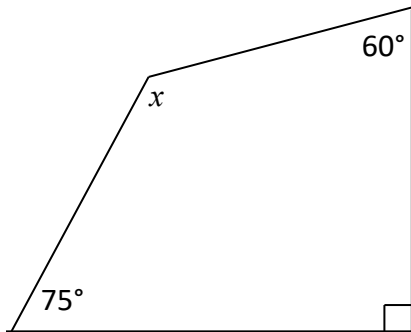
d)



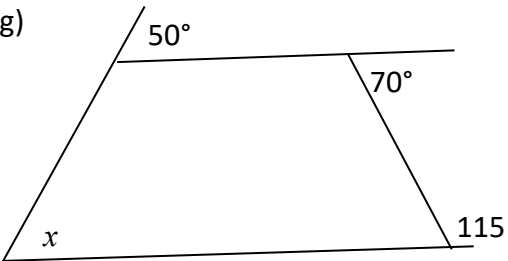
e)



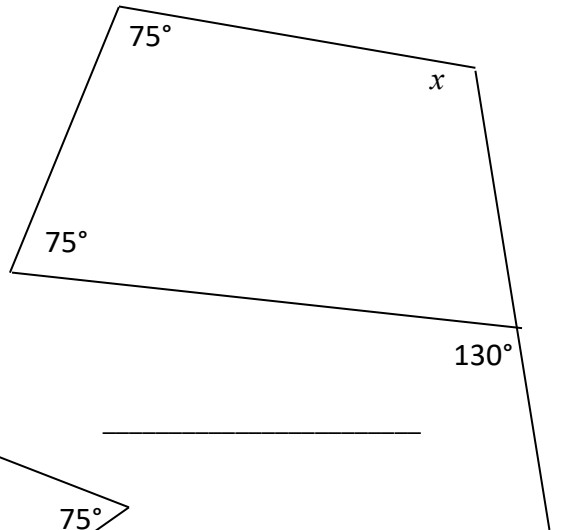
f)



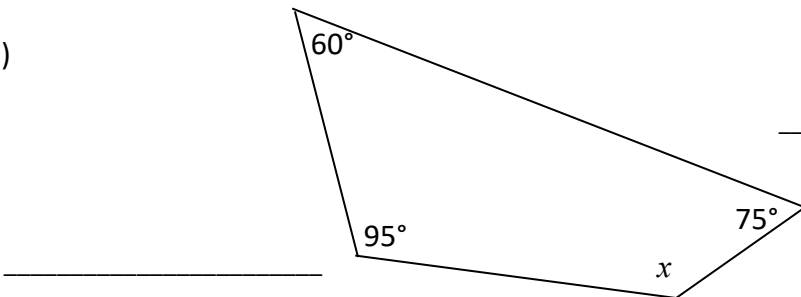
g)



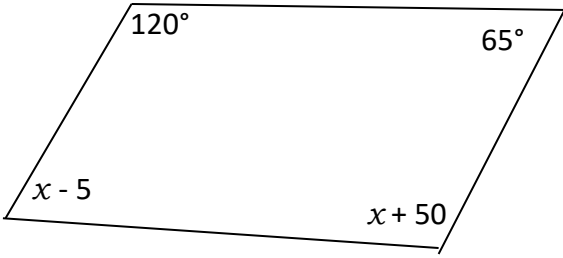
h)



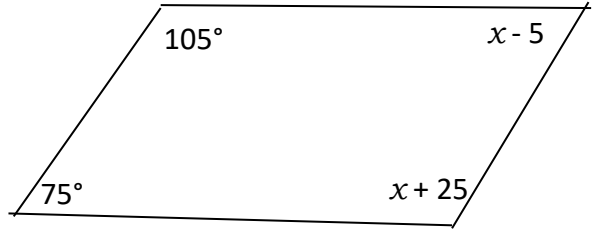
i)



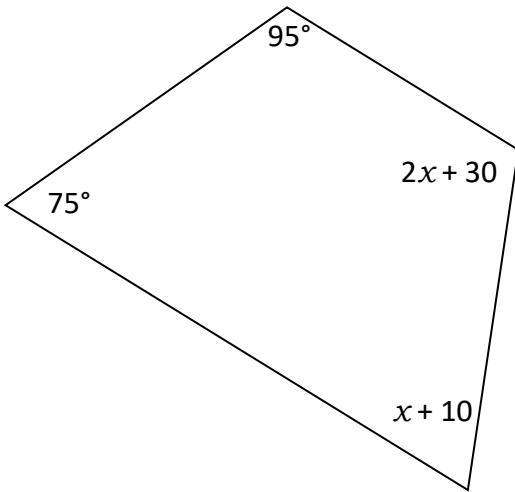
j)



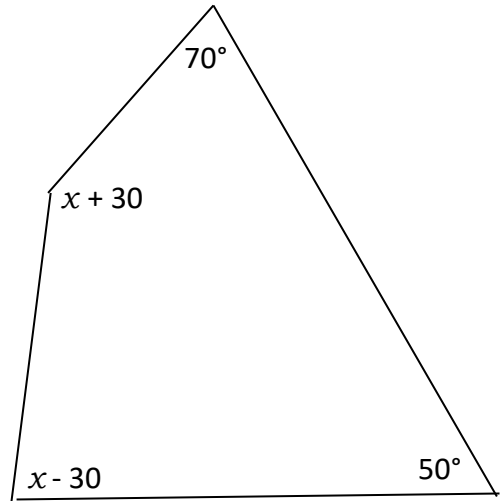
k)



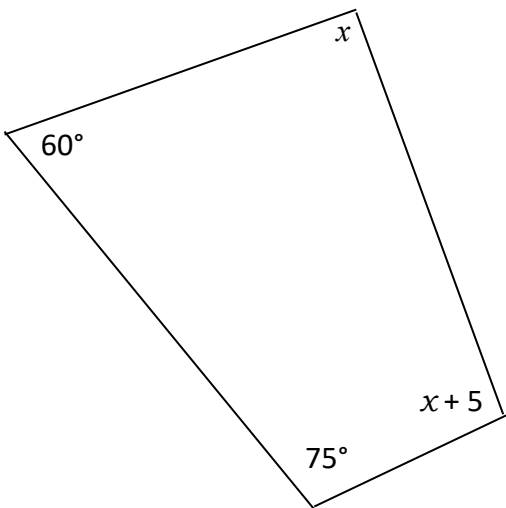
l)



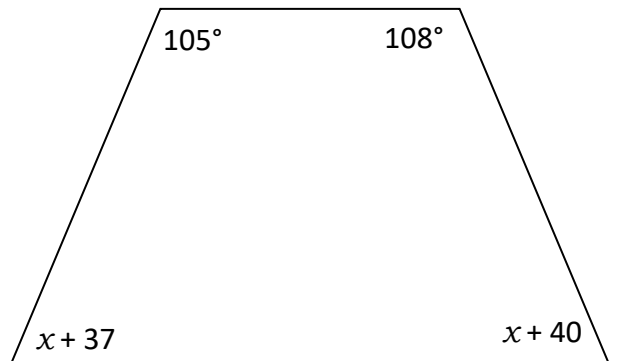
m)



n)



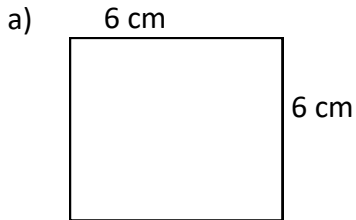
o)

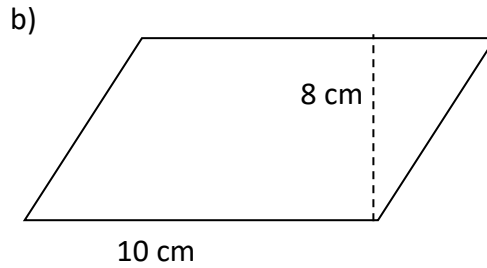


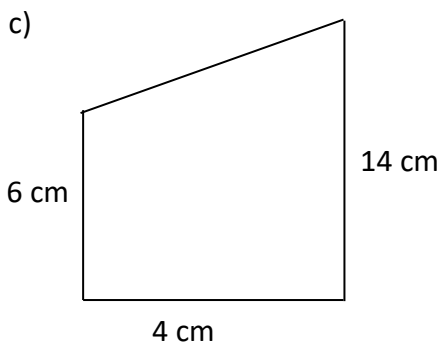
Exercise 11A

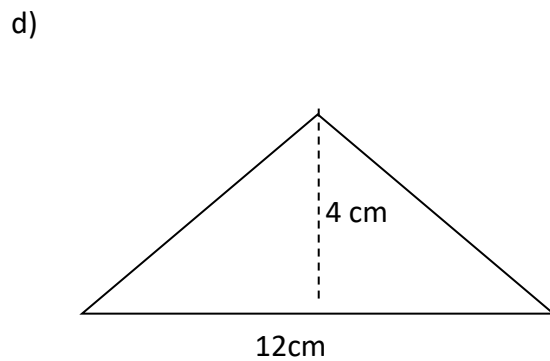
Finding the area of the shapes

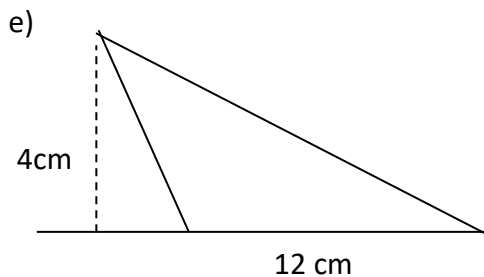
Q1 Find the area of each shape, remember to write the units as well.

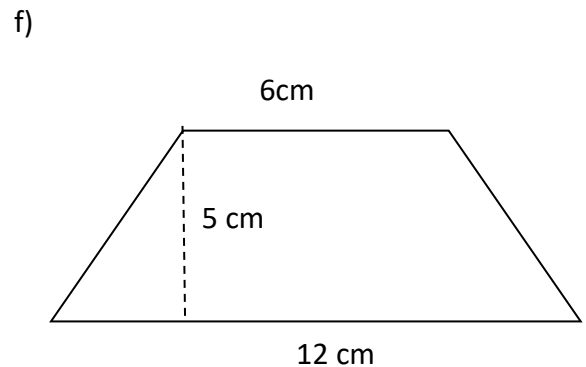








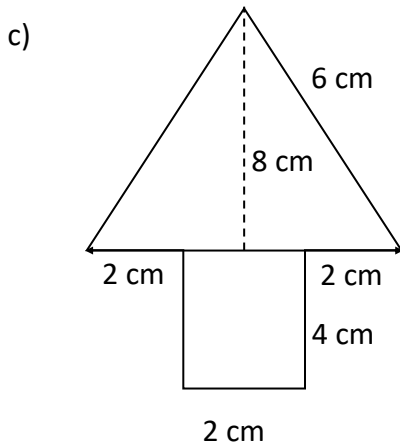
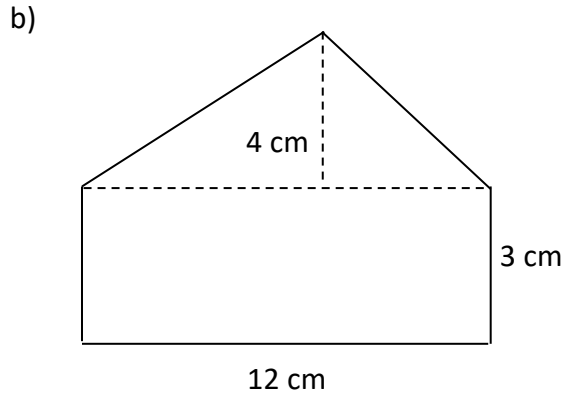
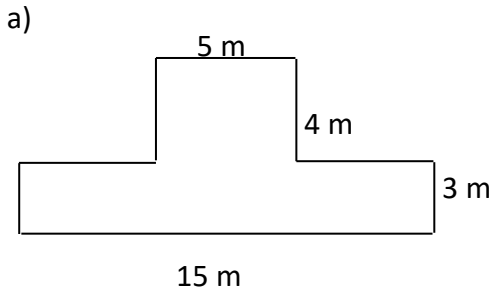




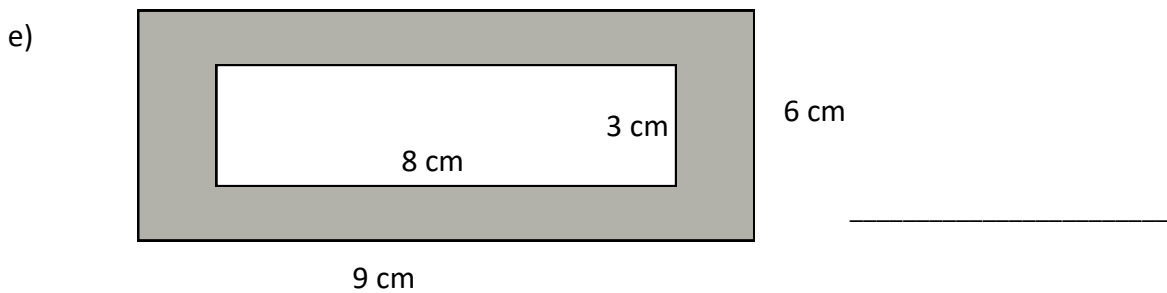
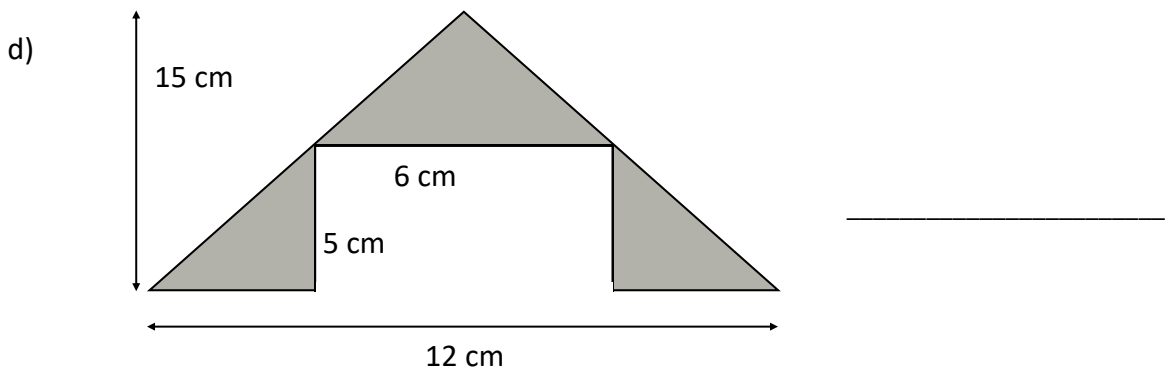
Exercise 11B

Finding the area of the compound shapes

Q1 Find the total area of the compound shapes



Find the area of the shaded shapes.

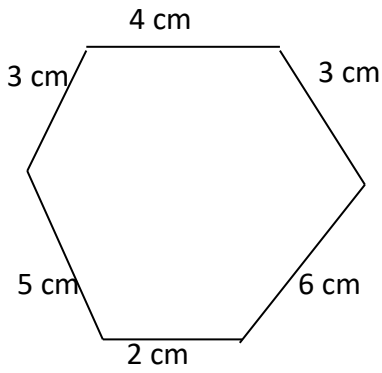


Exercise 11C

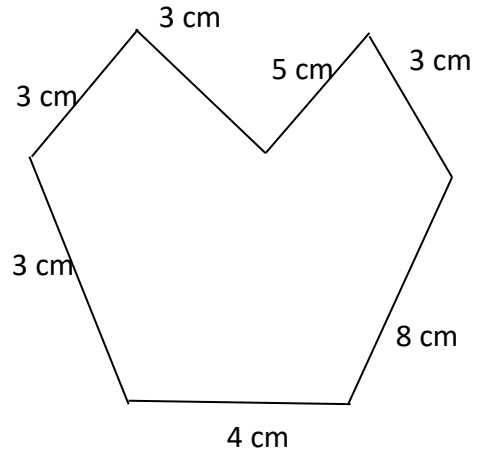
Finding the perimeter of the shapes

Q1 Find the perimeter of the following shapes

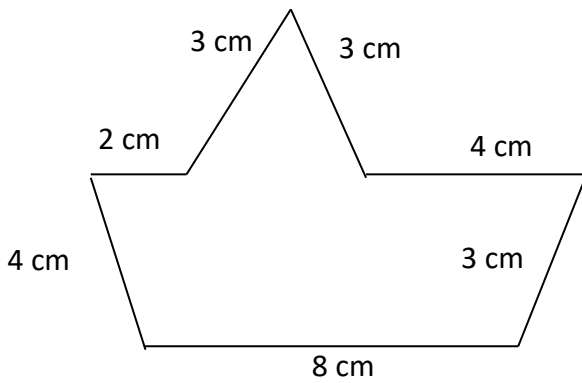
a)



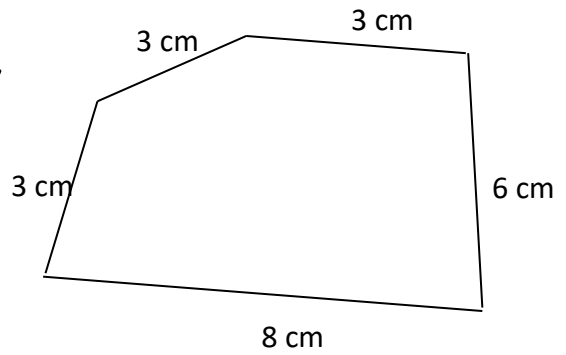
b)



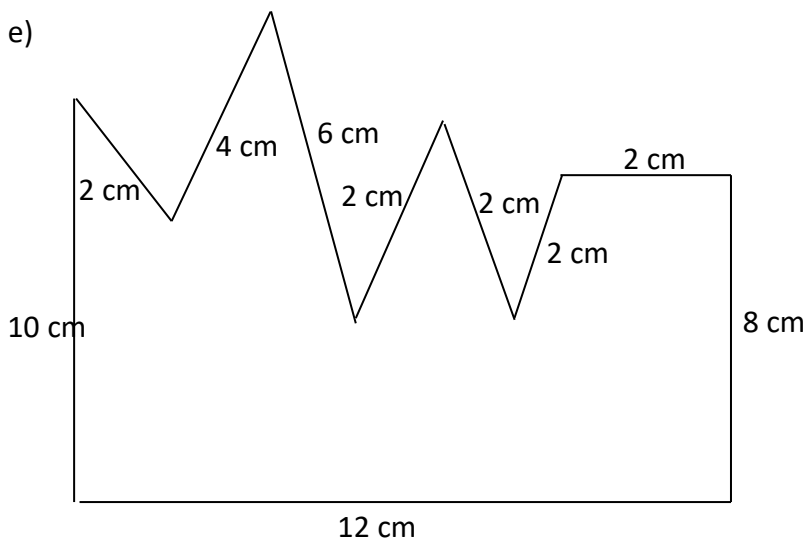
c)



d)



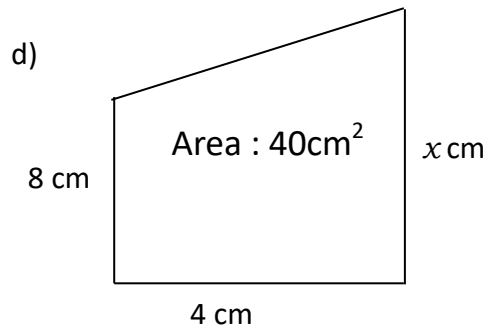
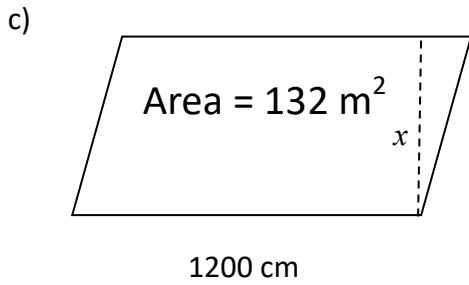
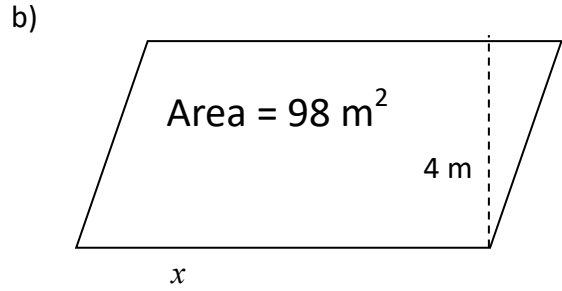
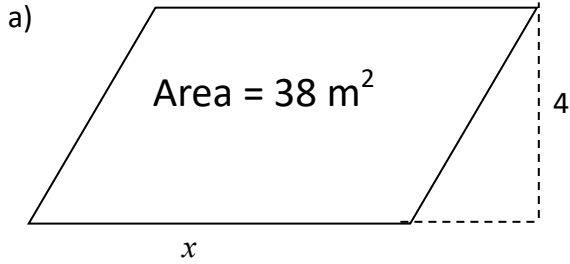
e)



Exercise 11D

Area & Perimeter problem solving

Q1 Solve the following problems.



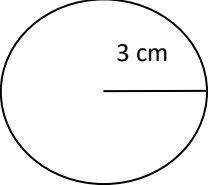
e) A trapezium has area 88 cm^2 and parallel sides 13.5cm and 8 cm. work out its height?

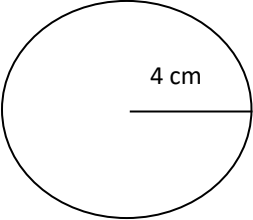
Exercise 12A

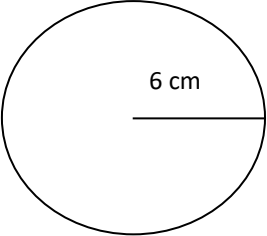
Finding the area & circumference

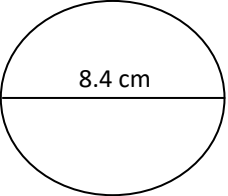
Q1 Find the area and the circumference of the following circles.

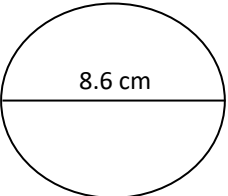
Find the a) area and b) the circumference of the circles. Give your answer in 2 d.p.

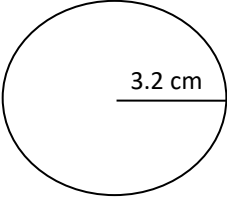
a)  _____

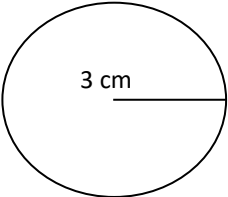
b)  _____

c)  _____

d)  _____

e)  _____

f)  _____

g)  _____

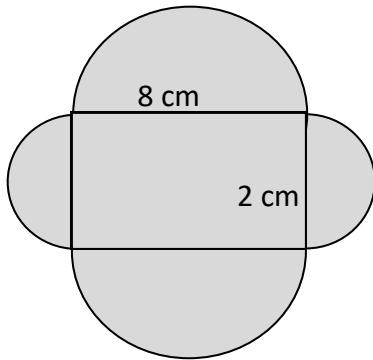
- h) Find the diameter of the circle with a circumference of 6.4 mm. _____
- i) Calculate the area of the circle with a circumference of 2.6 cm. _____
- j) What is the circumference of a circle with an area of 7 mm^2 ? _____
- k) The area of a circle is 8.6 m^2 , calculate the circumference of the circle? _____
- l) Calculate the circumference of a circle with an area of 7.3 cm^2 . _____

Exercise 12B

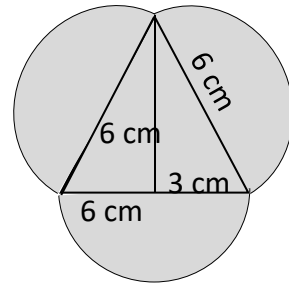
Compound shapes

Q1 Find the area of the shaded shape, for each of the following questions

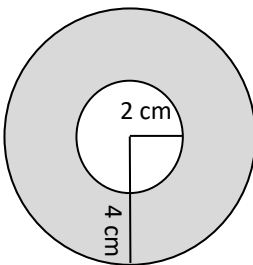
a)



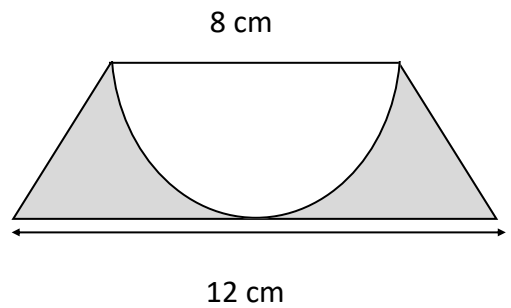
b)



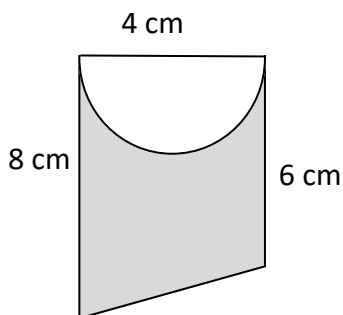
c)



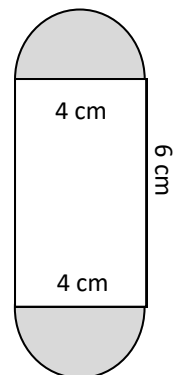
d)



e)



f)

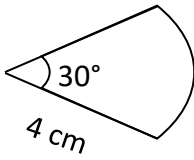


Exercise 12C

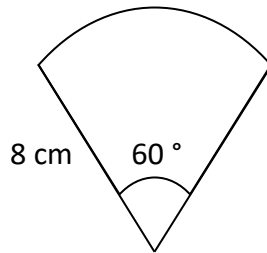
Length of an arc

Q1 Find the length of the following arcs.

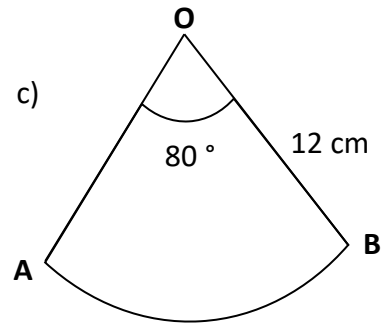
a)



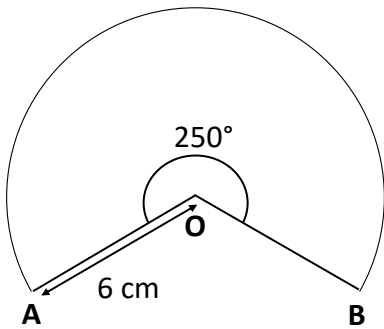
b)



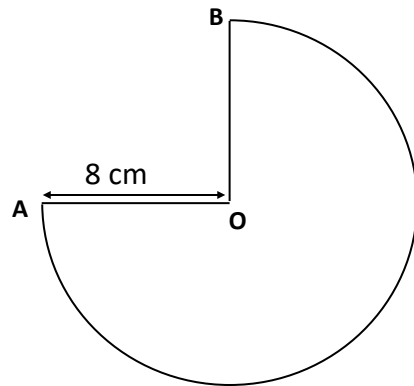
c)



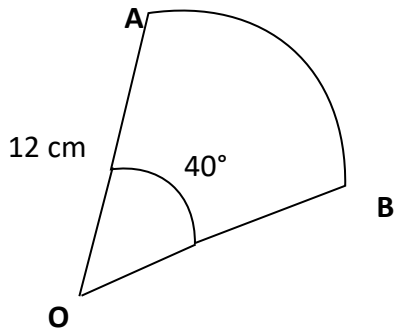
d)



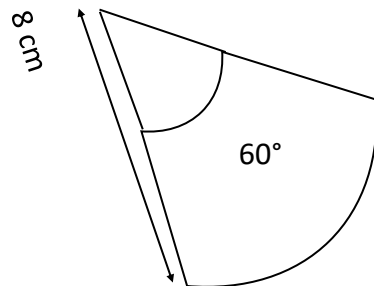
e)



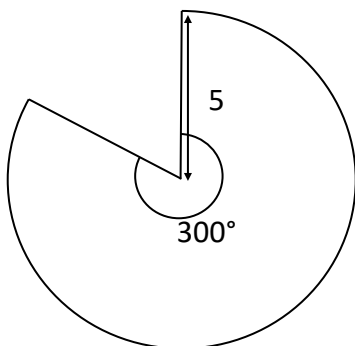
f)



g)



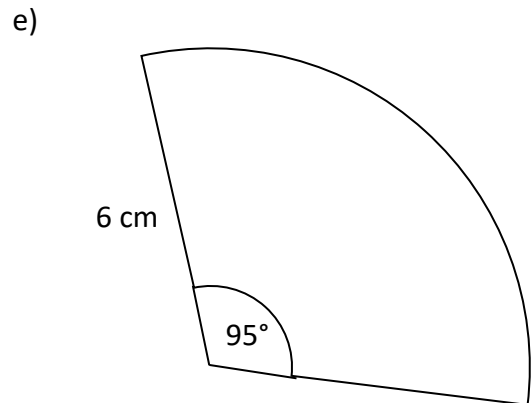
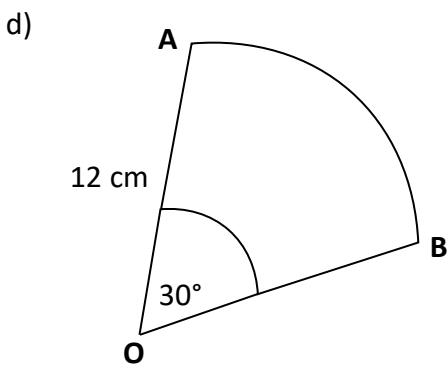
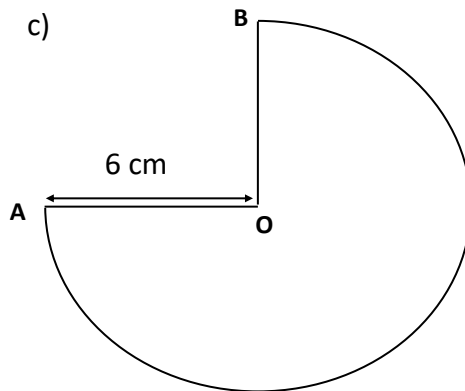
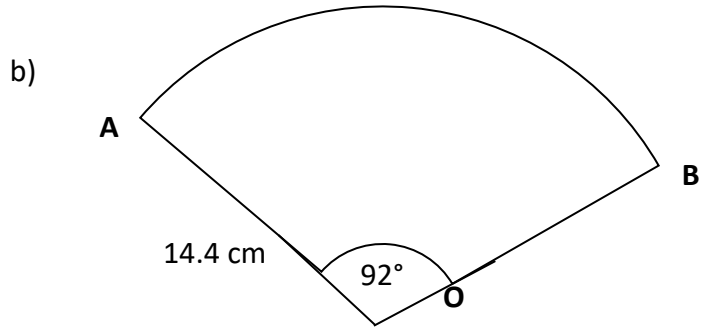
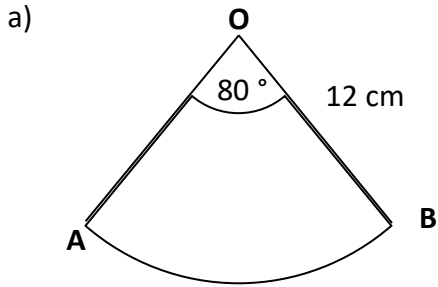
h)



Exercise 12D

Area of a sector

Q1 Find the area of the following sectors.



Exercise 13A

Linear Graph

Q1 Find the gradient and intercept of the following linear equations.

- | | | | |
|----|-------------------------|-------|-------|
| a) | $y = 5x - 4$ | _____ | _____ |
| b) | $3y = 3x - 21$ | _____ | _____ |
| c) | $y = 8x - 5$ | _____ | _____ |
| d) | $y = -7 - 4x$ | _____ | _____ |
| e) | $y = -\frac{1}{4}x + 8$ | _____ | _____ |
| f) | $y = -8 - x$ | _____ | _____ |
| g) | $4y = -2 + x$ | _____ | _____ |
| h) | $8y = -16 - 8x$ | _____ | _____ |
| i) | $3y = -1 + 4x$ | _____ | _____ |
| j) | $4y = -1 - 7x$ | _____ | _____ |

Q2 Equation of a straight line

Gradient = m

Intercept = c

- | | | | |
|----|--------------------|-------------------|-------|
| a) | $m = 8$ | $c = \frac{1}{4}$ | _____ |
| b) | $m = -8$ | $c = 4$ | _____ |
| c) | $m = -4$ | $c = -2$ | _____ |
| d) | $m = \frac{1}{4}$ | $c = 2$ | _____ |
| e) | $m = -\frac{1}{8}$ | $c = 6$ | _____ |
| f) | $m = -3$ | $c = 8$ | _____ |
| g) | $m = -4$ | $c = -4$ | _____ |
| h) | $m = 2$ | $c = 10$ | _____ |
| i) | $m = 5$ | $c = 5$ | _____ |
| j) | $m = 6$ | $c = 7$ | _____ |

Exercise 13B**Finding the gradients**

Find the gradients by using the following co - ordinates. (Extension question)

Example : ***A(7,3) , B(1,2). Find the gradient of line AB***

$$\text{Gradient} = \frac{\text{Difference of y coordinates}}{\text{Difference of x coordinates}} = \frac{3 - 2}{7 - 1} = \frac{1}{6}$$

- a) A(4,3) , B(1,2) _____ b) A(6,2) , B(1,8) _____
 c) A(7,- 4) , B(8 , - 4) _____ d) A(-7,3) , B(-3,-2) _____
 e) A(-9,-3) , B(8,-2) _____ f) A(-10,-3) , B(1,2) _____
 g) A(-8,7) , B(3,-2) _____ h) A(-10,-8) , B(11,3) _____
 i) A(12,10) , B(2,4) _____ j) A(8,4) , B(-1,2) _____

Exercise 13C**Finding the equations with the points**

Find the equations of the line joining the point A and point B (Extension questions)

Example : ***A(7,3) , B(1,2). Find the equation of the line AB***

$$\text{Gradient} = \frac{\text{Difference of y coordinates}}{\text{Difference of x coordinates}} = \frac{3 - 2}{7 - 1} = \frac{1}{6}$$

$$Y - 3 = \frac{1}{6} (X - 7)$$

$$6(Y - 3) = (X - 7) \qquad 6Y - 18 = (X - 7)$$

$$6Y = X + 11$$

- a) A(4,3) , B(1,2) _____

b) $A(6,2)$, $B(1,8)$ _____

c) $A(7,-4)$, $B(8,-4)$ _____

d) $A(-7,3)$, $B(-3,-2)$ _____

e) $A(-9,-3)$, $B(8,-2)$ _____

f) $A(-10,-3)$, $B(1,2)$ _____

g) $A(-8,7)$, $B(3,-2)$ _____

h) $A(-10,-8)$, $B(11,3)$ _____

Exercise 14A**Simultaneous Equations - One step elimination**

a) $x + y = 4$

$x - y = 2$

b) $x + y = 10$

$x - y = 8$

Exercise 14B**Simultaneous Equations - Two step elimination**

a) $8x + 3y = 9$

$4x + 3y = 6$

b) $11x - 5y = 3$

$8x - 5y = 9$

Exercise 14C**Simultaneous Equations - Three step elimination**

a) $5x - 4y = 7$ _____
 $7x - 2y = 17$ _____

b) $4x + 2y = 8$ _____
 $x + 3y = 2$ _____

Exercise 14D**Simultaneous Equations - Solving by substitution**

a) $y + 1 = 2x$ _____
 $y = x + 2$ _____

b) $3y - 2x = -38$ _____
 $y = 3x - 43$ _____

Exercise 14E**Simultaneous Equations - Solving by graph**

Use your exercise book to answer this question.

a) $6y - 13x = 72$
 $y = x + 7$

b) $2x - 3y = -1$
 $x = -2y + 10$

c) $7x - y = 12$
 $y = 5x - 2$

d) $y - 2x = 18$
 $y = x - 2$

e) $4x - y = 12$
 $y = 7 - x$

f) $x + y = 10$
 $y = x - 8$

g) $3x + y = 7$
 $y = 2x - 3$

h) $y - x = 12$
 $y = x - 3$

i) $4x - y = 10$
 $y = 5 - x$

j) $x + y = 4$
 $y = x - 2$

k) $2x + y = 4$
 $y = x - 2$

l) $x + y = 4$
 $2y = x - 2$

m) $x - y = 4$
 $y = x - 2$

n) $2x - y = 4$
 $y = x - 2$

o) $x + y = 4$
 $2y = x + 2$

p) $3x - y = 4$
 $y = x - 2$

q) $x - 2y = 4$
 $y = x - 2$

r) $x + 3y = 4$
 $2y = x + 2$

s) $x - 3y = 4$
 $y = x - 2$

t) $4x - y = 4$
 $y = x - 2$

u) $2x + 3y = 4$
 $2y = x + 2$

Exercise 14F**Simultaneous Equations - with quadratic equations**

a) $y = x^2 - 3x$ _____

$y = x - 4$ _____

b) $y^2 = 2x^2 - 4x$ _____

$y = x - 4$ _____

c) $x^2 = y^2 - 6$ _____

$y = x - 2$ _____

d) $y^2 = 2x^2 - 9$ _____

$y = x - 5$ _____

e) $y = 2x + 1$ _____
 $y = x^2 - 1$ _____

f) $y = x^2 - 4x$ _____
 $y = x - 3$ _____

g) $2x^2 = y^2 - 3$ _____
 $x = y + 4$ _____

h) $y = x^2 - 5x$ _____
 $y = x - 5$ _____

i) $x^2 = y - 7$ _____

$y = 3x^2 - 5x$ _____

j) $5x^2 = y^2 + 5$ _____

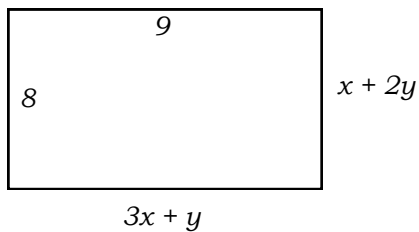
$y = x - 1$ _____

Exercise 14G

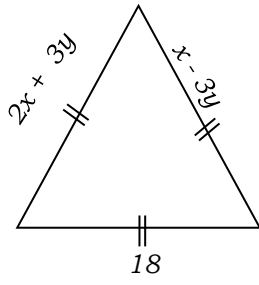
Simultaneous Equations - Applications

Form the simultaneous equation and find x and y.

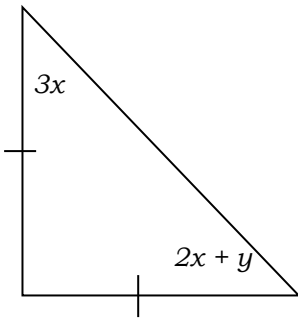
a)



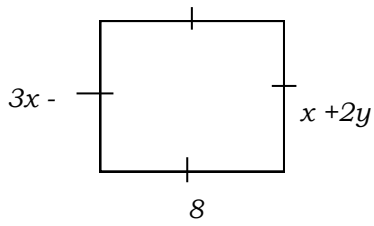
b)



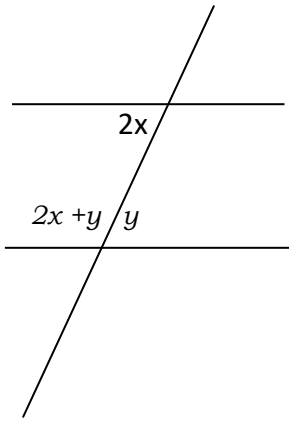
c)



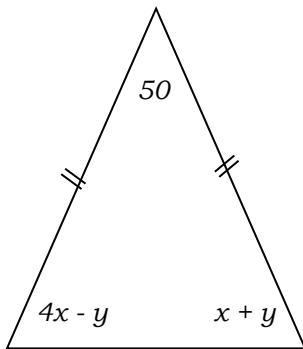
d)



e)



f)



Exercise 14H**Simultaneous Equations - Word problems**

- a) The sum of two numbers is 60 and their difference is 40. Find the numbers.

- b) The difference between the two numbers is 11. Two times the smaller number added to the larger number gives 44. Find the two numbers.

- c) The sum of two numbers is 8. The difference in their squares also 8. Find the number.

- d) Three tables and one chair cost £1600 and one table and one chair cost £800. Find the cost of the table.

e) I am three times older as my daughter. After five years , I will be two and half times as old as my daughter. Find my present age and the present age of my son.

f) In the triangle, sum of two angles is 90° which is the measure of the third angle. Also the difference of these two angles is 10° . Find the measure of these two unknown angles.

g) A fraction becomes $\frac{10}{7}$ if 2 is added to both numerator and denominator. If however 3 is subtracted from both numerator and denominator, the fraction becomes $\frac{5}{2}$.
What is the fraction?

h) Peter buys 3 fiction books and 2 non fiction books for £32. he writes this as an equation $3x + 2y = 32$ where x is the cost of fiction books and y is the cost of non fiction . Rose buys 3 fiction books and one non fiction book for £22.

i) Write the equation for rose.

ii) Draw the graph of $3x + 2y = 32$

iii) Draw the graph of Rose's equation on the same axis.

iv) Write the co-ordinates of the point where the two lines cross.

v) The x co-ordinate of the point where the two lines cross gives the cost of a fiction book in pounds (£). How much does a fiction book costs?

vi) How much does a non fiction cost?

i) Find the two numbers such that thrice the first added to the second is 38 and the first added to two times of the second is 36.

k) A book shop makes a profit of 4 pence on each maths book sold and a profit of 6 pence on each science book sold. One Monday the shop makes a profit of £6.50 by selling 120 books. How many maths books were sold?

Exercise 15A

Simplifying fractions

a)
$$\frac{x^3 - 2x^2 + x}{x^4 - 2x^3 + x^2}$$

b)
$$\frac{x^2 + 5x + 4}{x^2 + 3x + 2}$$

c)
$$\frac{x^3 + 7x^2 + 10x}{x^3 - x^2 - 6x}$$

d)
$$\frac{x^2 + 4x - 12}{x^3 - 2x^2}$$

e)
$$\frac{x^3 - 4x^2 - 21x}{x^4 - 2x^3 - 35x^2}$$

f)
$$\frac{x^6 - x^4}{x^4 - x^3}$$

g)
$$\frac{x^8 - x^4}{x^8 + 2x^6 + x^4}$$

h)
$$\frac{x^7 - x}{x^4 + x}$$

i)
$$\frac{x^2 - 11x - 12}{x^2 - 12x}$$

j)
$$\frac{x^2 - 5x - 50}{x^2 - 6x - 55}$$

Exercise 15B**Addition and Subtraction of fractions**

a)
$$\frac{3}{x} + \frac{4}{x}$$

b)
$$\frac{2}{5x} + \frac{3}{10x}$$

c)
$$\frac{7}{8x} + \frac{1}{2x}$$

d)
$$\frac{10}{11x} + \frac{12}{13x}$$

e)
$$\frac{2}{x} + \frac{3}{x^2}$$

f) $\frac{9}{7x} - \frac{3}{4x}$

g) $\frac{7}{12x} - \frac{3}{24x}$

h) $\frac{11}{12x} - \frac{3}{4x}$

i) $\frac{3x}{8} - \frac{2x}{5}$

j) $\frac{x}{2} + \frac{2x}{3}$

k) $\frac{5x}{11} - \frac{4x}{22}$

l) $\frac{3x}{5} - \frac{x}{15}$

m) $\frac{7x}{6} - \frac{8x}{12}$

n) $\frac{9x}{108} - \frac{7x}{12}$

o) $\frac{3x}{11} - \frac{x}{2}$

Exercise 15C**Work out these additions. Answer as a single fraction**

a)
$$\frac{x+1}{3} + \frac{x+2}{2}$$

b)
$$\frac{2x+1}{11} + \frac{3x+2}{3}$$

c)
$$\frac{y+3}{8} + \frac{y+1}{16}$$

d)
$$\frac{x-3}{2} + \frac{2-x}{3}$$

e)
$$\frac{7}{x+1} + \frac{3}{x+2}$$

e) $\frac{3}{x-2} + \frac{4}{x}$

f) $\frac{12}{x} + \frac{3}{x+1}$

g) $\frac{2(x+1)}{7} + \frac{3(x-1)}{8}$

h) $\frac{9}{x-1} + \frac{3}{x+2}$

i) $\frac{7}{x} + \frac{1}{x+1}$

k) $\frac{13}{x} + \frac{1}{x-2}$

l) $\frac{5(2x+1)}{6} + \frac{2(x-2)}{3}$

m) $\frac{5}{x-5} + \frac{3}{x+5}$

n) $\frac{8}{x+3} + \frac{9}{x-1}$

o) $\frac{9}{x-1} + \frac{3}{x+1}$

Exercise 15D**Work out these subtractions. Answer as a single fraction**

a)
$$\frac{7}{x-1} - \frac{8}{x+2}$$

b)
$$\frac{3}{2x-1} - \frac{4}{2x-3}$$

c)
$$\frac{2}{2x-1} - \frac{3}{x+2}$$

d)
$$\frac{5}{x} - \frac{3}{x+1}$$

e)
$$\frac{10}{x+2} - \frac{4}{x-3}$$

f) $\frac{5}{2x-7} - \frac{6}{2x-3}$

g) $\frac{3}{x-6} - \frac{2}{x-1}$

h) $\frac{11}{x-2} - \frac{2}{x-1}$

i) $\frac{3}{x-3} - \frac{7}{x+2}$

j) $\frac{8}{x-3} - \frac{4}{x+1}$

k) $\frac{5}{x-4} - \frac{2}{x-3}$

l) $\frac{10}{x-2} - \frac{11}{x-2}$

m) $\frac{2}{x-5} - \frac{3}{x+5}$

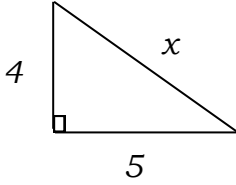
n) $\frac{9}{x+5} - \frac{4}{x-5}$

o) $\frac{7}{x+6} - \frac{4}{x-3}$

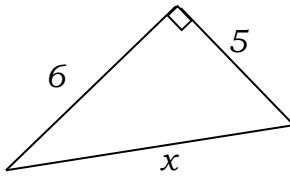
Exercise 16A

Pythagoras theorem. Finding hypotenuse.

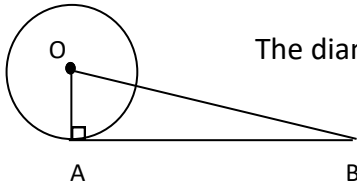
a)



b)

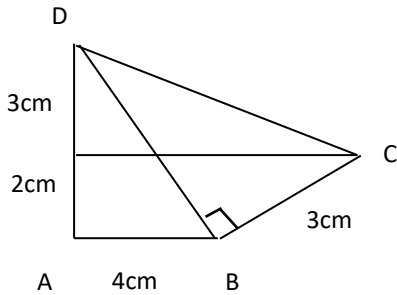


c)



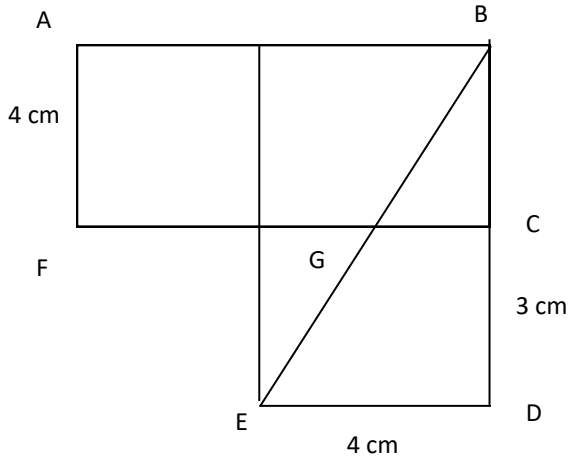
The diameter of a circle is 4cm. $AB = 3$ cm. Find the length of OB .

d)



Find the lengths of BD and CD .

e)

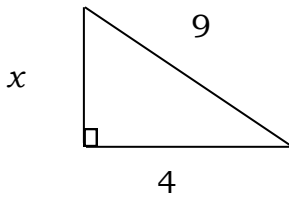


Exercise 16B

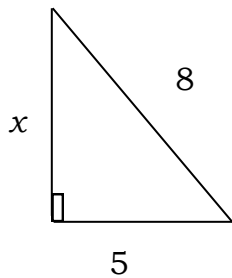
Pythagoras theorem. Finding one of the other side

Find x in the following diagrams

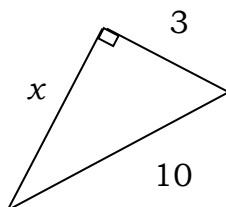
a)



b)



c)



Exercise 16C**Pythagoras theorem - Word questions**

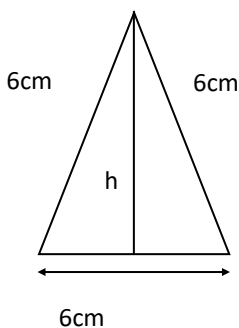
- a) One side of a rectangle is 5cm and the diagonal measures 12cm. Calculate the length of the other side.

- b) A picture frame diagonal is 11.2cm. One side of that frame is 4.3cm, find the length of the other side of the frame.

- c) In a square, the diagonal measures 5cm. Find the length of the sides.

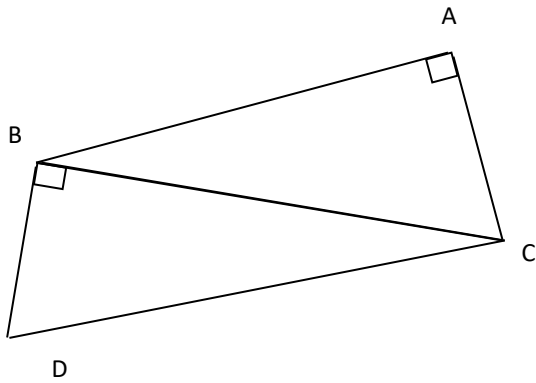
- d) In a billiard table, the diagonal is 5cm and one of the side is 4cm. Find the length of the other side.

- e)



Find h in the diagram.

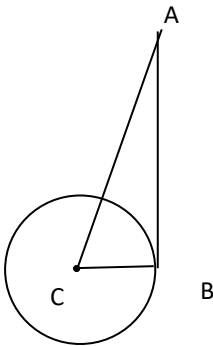
f)



$AC = 3\text{cm}$ $AB = 4\text{cm}$ $CD = 7\text{cm}$.

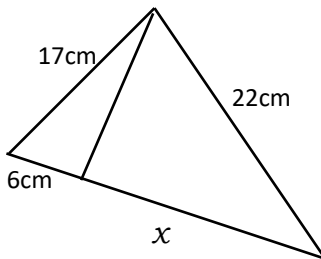
Find the length of BD .

g)



$AC = 11\text{cm}$. the radius of the circle is 4cm . Find the length of AB .

h)



Find x .

Exercise 16D

Pythagoras theorem. Mixed questions

a)

A rhombus with side length 45cm has a diagonal length of 17cm . Calculate the length of the other diagonal

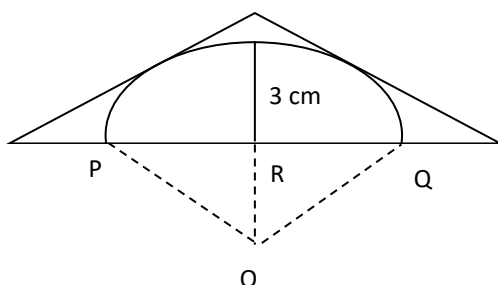
- b) A train is travelling 40km towards south west. The train is 22km from its starting point towards west. How far the train is from north line?

- c) A diagonal of cricket pitch is 80cm long and the long side measures 120cm. Find the length of the short side of the pitch.

- d) In PQR, $PQ = PR = 6.8$ cm and QR is 7.9 cm. Find the height of the triangle from P.

- e) A circle with centre O has a radius of 7 cm. The length from the midpoint of the chord is 4cm.. Find the length of the chord.

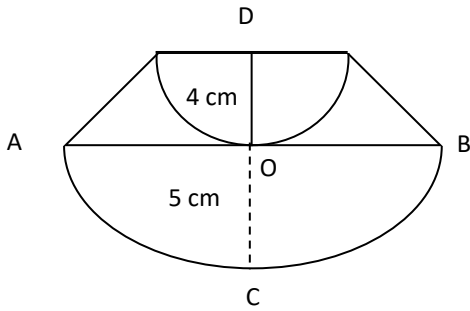
- f) The diagram shows the cross-section of a tunnel which has a maximum height of 3 cm above the horizontal base PQ. The roof of the tunnel is part of circle, centre O and radius 8 cm. R is the midpoint of PQ.



Find

- (a) The length of OR _____
- (b) The length of PR _____
- (c) The width of the tunnel at its base.

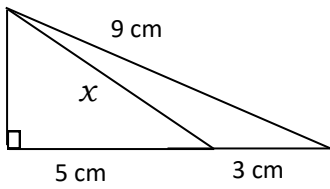
g)



i) Find the length of AD.

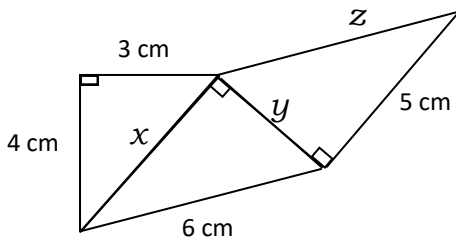
ii) Find the length of AC.

h)



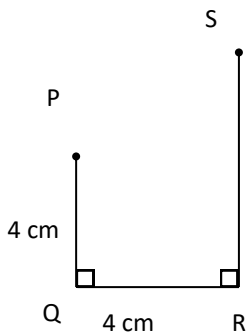
Find x

i)



Find x , y and z

j)



A thin wire of length 24 cm. Find the length of

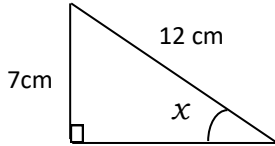
(a) RS

(b) PS

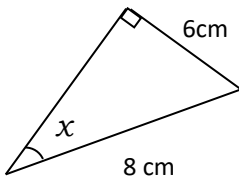
Exercise 17A

Finding the unknown angle (SINE ratio)

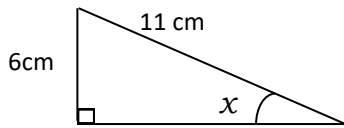
a)



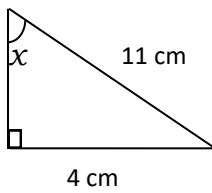
b)



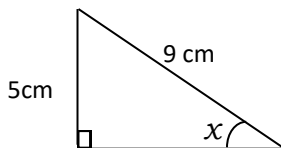
c)



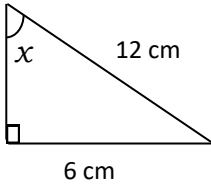
d)



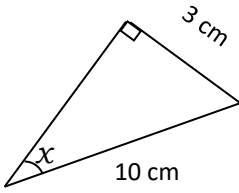
e)



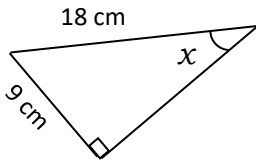
e)



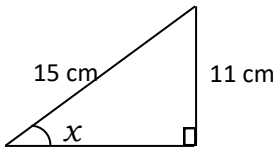
f)



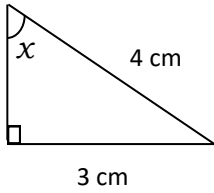
g)



h)



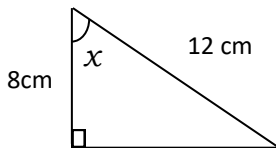
i)

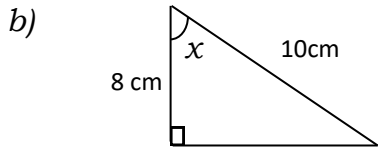


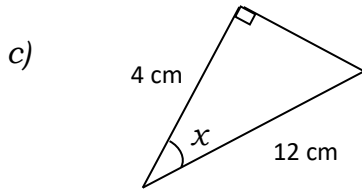
Exercise 17B

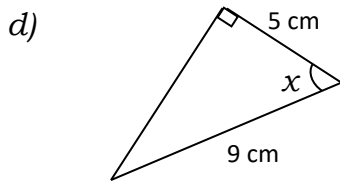
Finding the unknown angle (COSINE ratio)

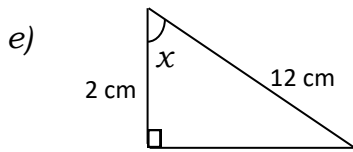
a)

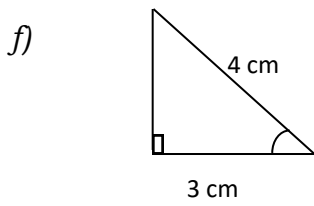


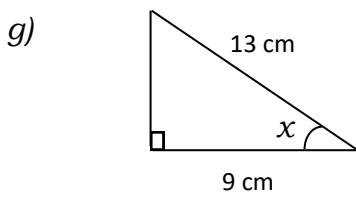




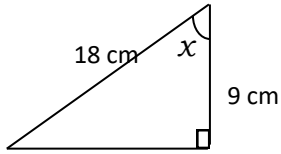




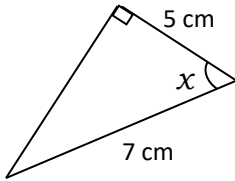




h)



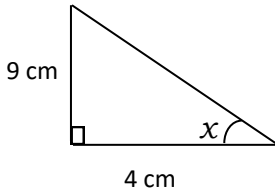
i)



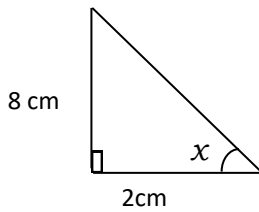
Exercise 17C

Finding the unknown angle (TANGENT ratio)

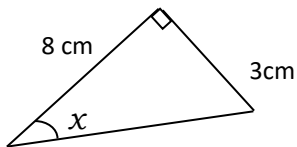
a)



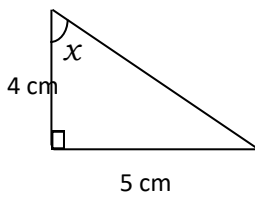
b)



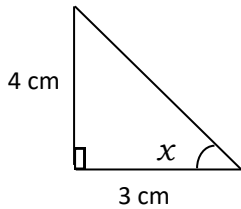
c)



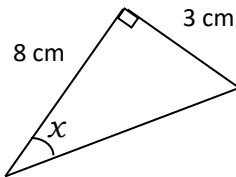
d)



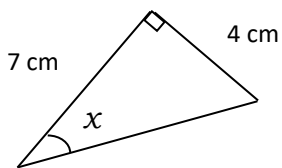
e)



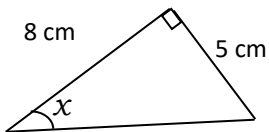
f)



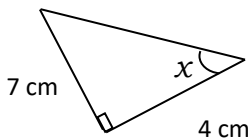
g)



h)



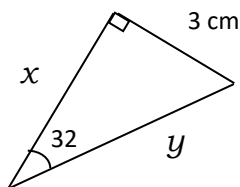
i)



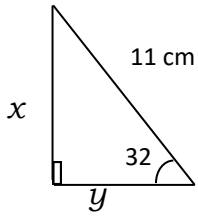
Exercise 17D

Finding the unknown sides

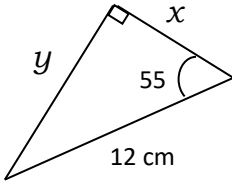
a)



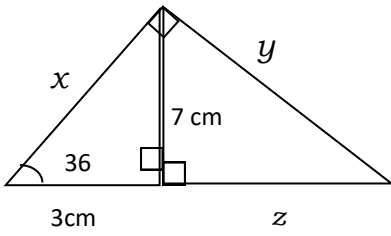
b)



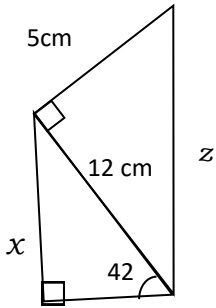
c)



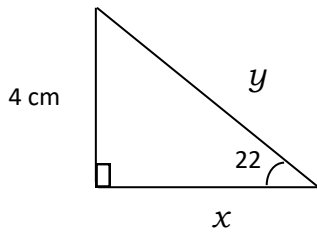
d)



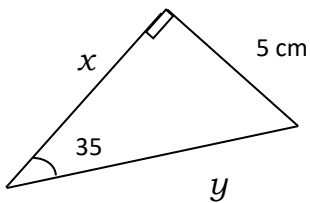
e)

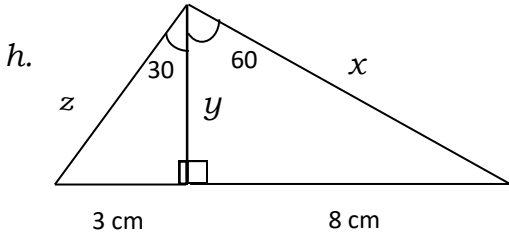


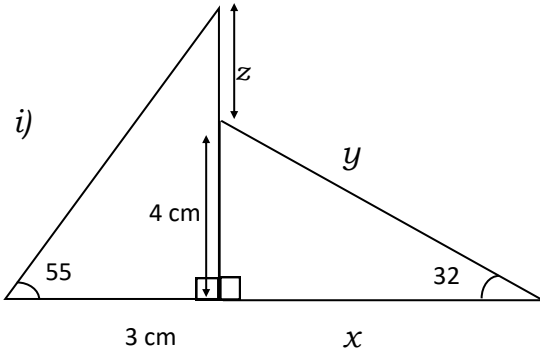
f)

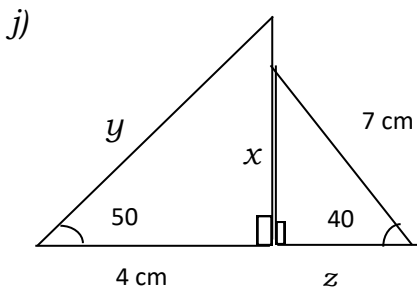


g)









Exercise 17E

Word problems

a) A ladder leans against a vertical wall with its foot 1.5 metres from the wall making an angle 45° with the ground. How long is the ladder?

b) A tree 22 metres tall casts a shadow 20.5 metres long. What angle do the rays of the sun make with the ground.

c) A building that is 55 cm tall casts a horizontal shadow 35m long. Find the angle of elevation of the sun to the nearest degree.

d) From a point on the ground 25m from the base of tree, the angle of elevation of the top of the tree is 55° . Find the height of the tree to the nearest metre.

e) Peter is 1.6m tall and is 20 metres away from a building 42m high. What is the angle of elevation of the top of the building from his eyes.

f) A pillar 15 metres tall casts a shadow 17.5metres long. What angle do the rays of the sun make with the ground.

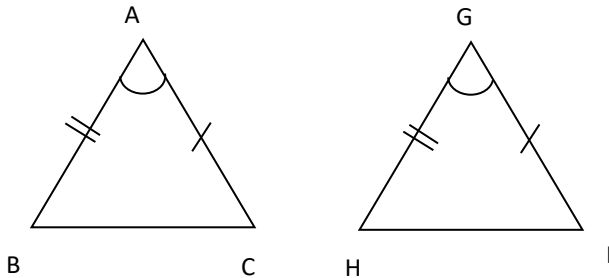
g) A railway track rises uniformly 6.8m for every 350m along the track. Find the angle of elevation of this track to the nearest degree.

h) Ayshu is sitting in a park and look towards the top of a 130m tall tree at an angle of elevation of 32° . How far is the sitting from the base of the tower.

i) A building that is 55m tall form a horizontal shadow 35.3m long. Find the angle of elevation

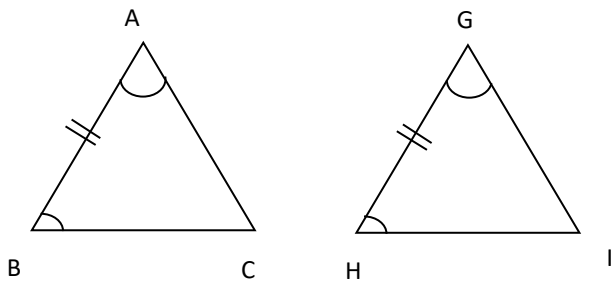
RULES

RULE 1



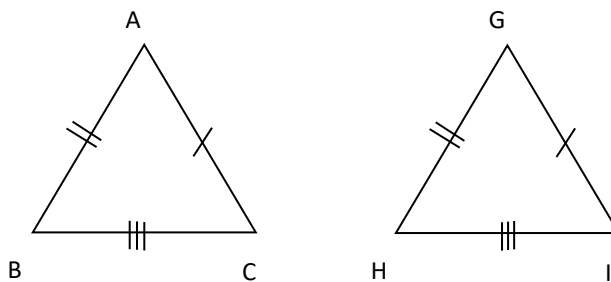
$\triangle ABC, \triangle HGI$
 $AB = GH$
 $AC = GI$
 $\angle A = \angle G$
 $\therefore \triangle ABC \equiv \triangle HGI$ (SAS)

RULE 2



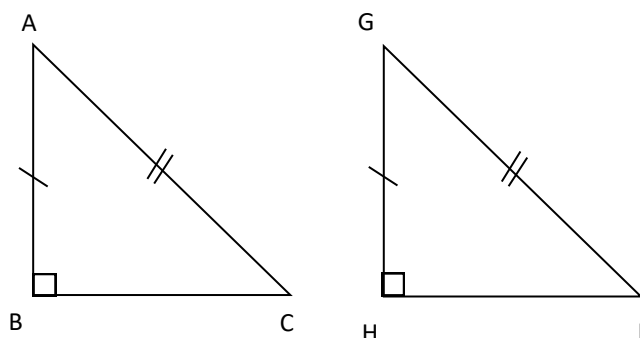
$\triangle ABC, \triangle HGI$
 $AB = GH$
 $\angle A = \angle G$
 $\angle B = \angle H$
 $\therefore \triangle ABC \equiv \triangle HGI$ (ASA)

RULE 3



$\triangle ABC, \triangle HGI$
 $AB = GH$
 $AC = GI$
 $BC = HI$ (SSS)

RULE 4

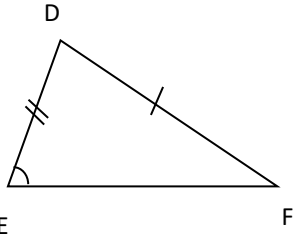
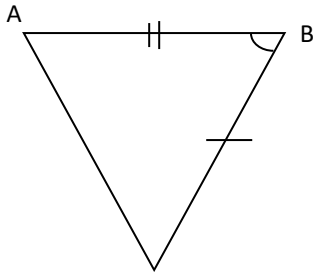


$\triangle ABC, \triangle HGI$
 $AB = GH$
 $AC = GI$
 $\therefore \triangle ABC \equiv \triangle HGI$ (RHS)

Exercise 18A

Congruent

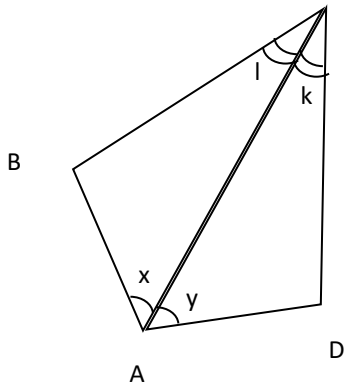
a)



$\angle A = \angle D$ $\angle B = \angle E$

C

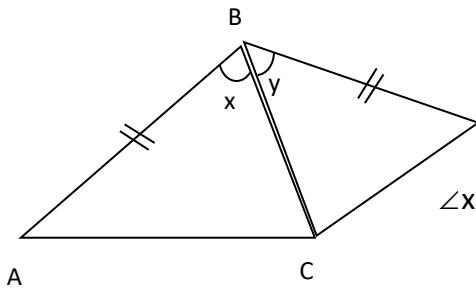
b)



$\angle l = \angle k$

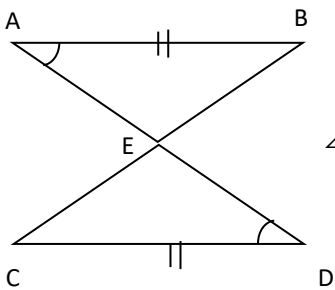
$\angle x = \angle y$

c)

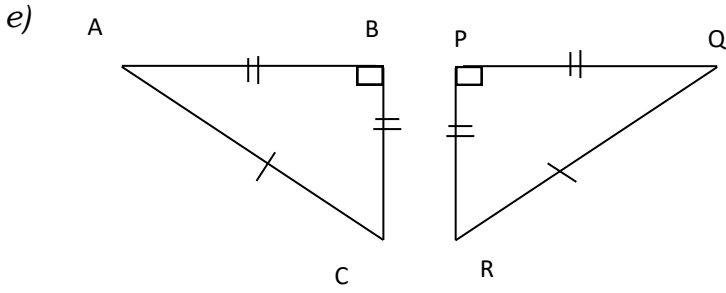


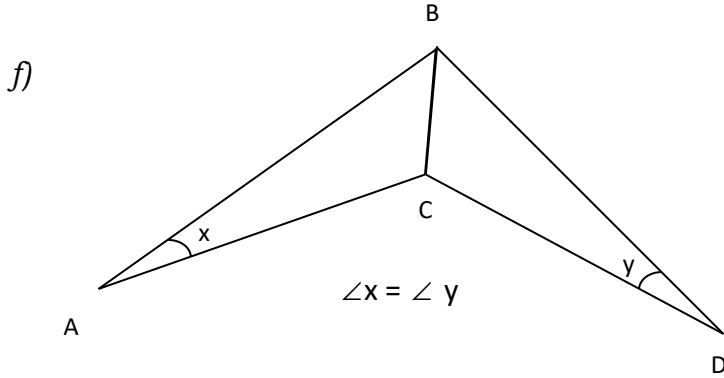
$\angle x = \angle y$

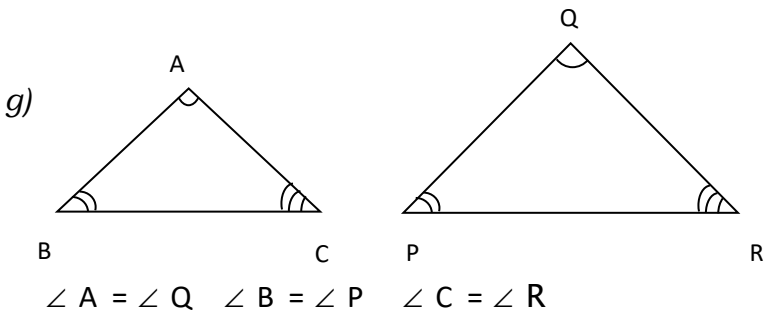
d)

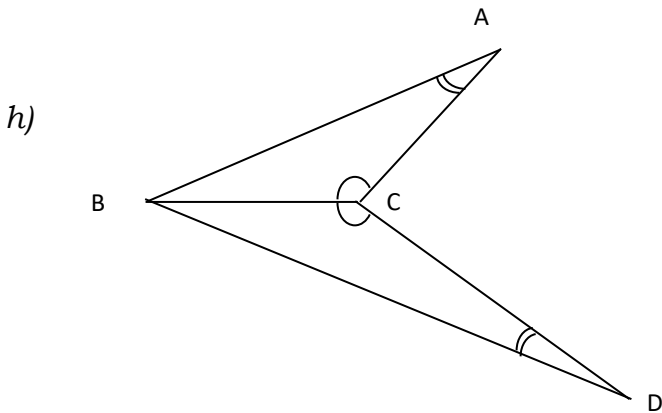


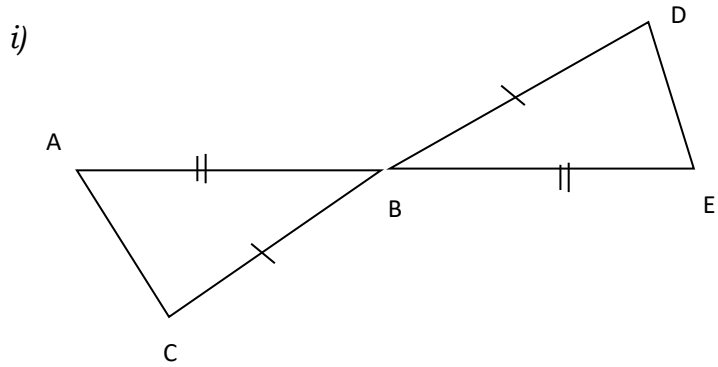
$\angle A = \angle D$

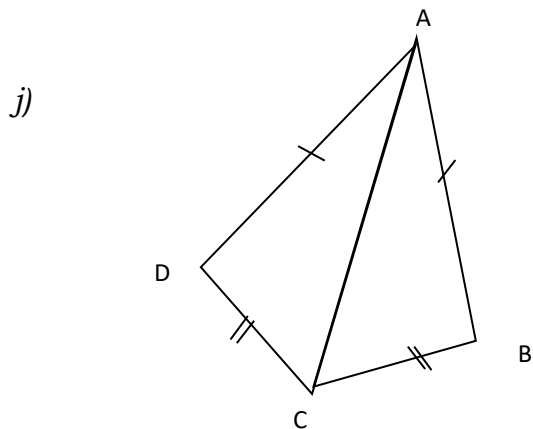


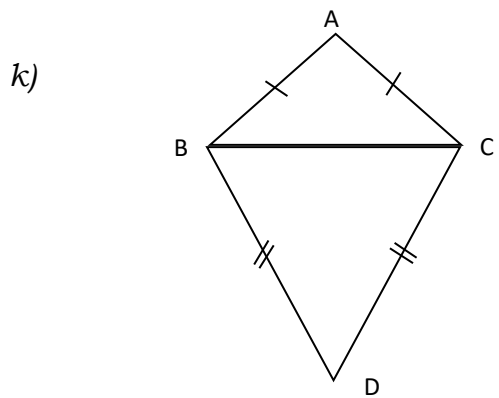


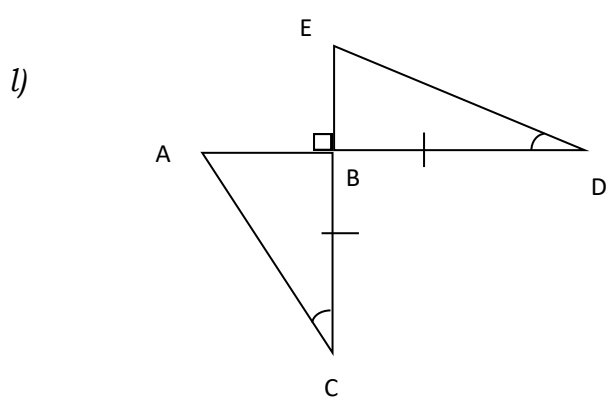




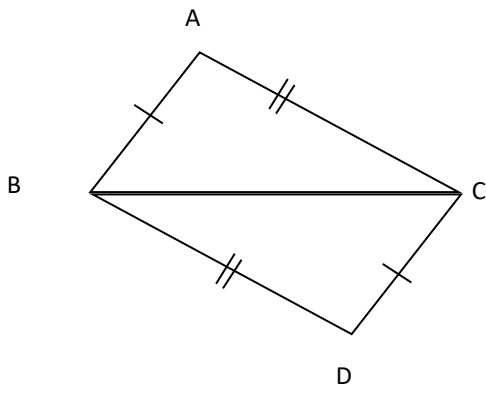




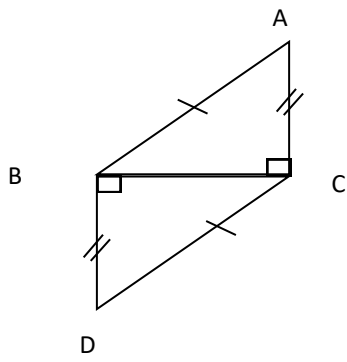




m)



n)



OUR PUBLICATIONS (LEC)

NO	NAME	STATUS	AUTHOR
1	Year 10 Easy Going Maths	Published	M.Nat
2	Year 11 Easy Going Maths 1	Published	M.Nat
3	Easy Going Verbal reasoning B1 &2	Published	M.Nat
4	Easy Going Non Verbal reasoning B1&2	Published	M.Nat
5	Easy Going Mathematics Book 1	Published	M.Nat
6	Easy Going Mathematics Book 2	Published	M.Nat
7	Easy Going Mathematics Book 3	Published	M.Nat
8	Easy Going Mathematics Book 4	Published	M.Nat
9	Easy Going Mathematics Book 5	Published	M.Nat
10	Easy Going Mathematics Year 3	Published	M.Nat
11	Easy Going English Year 3 Book 1 & 2	Published	J. Suki
12	Easy Going Mathematics Year 4	Published	M.Nat
13	Easy Going Verbal reasoning year 4	Published	M.Nat
14	Easy Going Non Verbal Reasoning Year 4	In Print	M.Nat
15	Easy Going English Year 4	In Print	M.Nat
16	Easy Going Maths Year 6	Published	M.Nat
17	Easy Going Maths KS3 (Y7,Y8,Y9)	Published	M.Nat
18	Year 11 Easy Going Maths 2	In print	M.Nat
19	Easy Going Maths Year 2	In Print	M.Nat
20	Y5 Comprehension	Published	R. Myra
21	Easy Going English Y2	Published	R. Myra

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