



Cumbernauld Academy

Mathematics Department



4th Level Upper

Block 2 - homework booklet

Topic 4

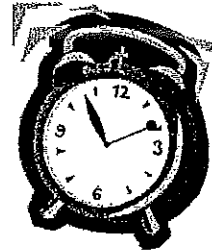


Calculators may be used in this Chapter where appropriate.



Exercise 1

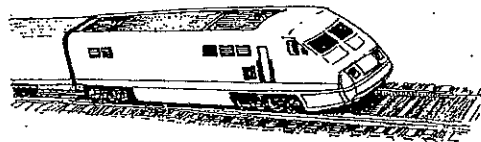
- Write the following times in 24 hour notation :-
(a) 3:30 am (b) 6:20 pm (c) 9:09 pm (d) midnight (e) noon.
- Write the following times in 12 hour notation :-
(a) 2310 (b) 0705 (c) 1012 (d) 0004 (e) 1615.
- Calculate how long it is from :-
(a) 3:25 pm to 8:10 pm (b) 1745 to 2020
(c) 0755 to 2210 (d) 06:35 am to 11:20 am
(e) 0808 to 2323 (f) 10:40 am to 11:30 pm.



Exercise 2

- Copy and complete the formula to calculate the distance travelled
- Use your formula to calculate each of the following distances :-
(a) A car travelling at 40 km/hr for 3 hours.
(b) A runner travelling at 9 m.p.h. for 2 hours.
(c) A train travelling at 85 km/hr for 4 hours.
(d) A jet travelling for 5 hours at a speed of 450 m.p.h.

$$D = \dots \times \dots$$

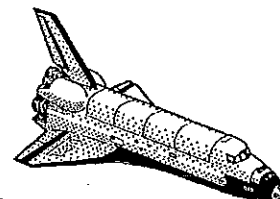


- A camel walks at 8 km/hr.
How far would it travel in :-
(a) 3 hours (b) 30 minutes (c) $\frac{1}{4}$ of an hour?



- (a) How far will Ellie jog at 14 km/hr if she runs for 45 minutes?
(b) How far will a car travel at 50 km/hr for 90 minutes?

- A spaceship travels at 3000 km/hr.
How far will it travel in a day?



Exercise 3

1. Copy and complete the formula for calculating speed :-

$$S = \frac{D}{\dots}$$

2. Use your formula to calculate the following speeds :-

- (a) A car travels 180 kilometres and takes 3 hours.
- (b) A plane flying for 8 hours and travelling 3200 miles.
- (c) A bird flying 20 kilometres and taking 2 hours.



3. A train has to make a journey of 200 kilometres.

How fast would it need to travel to complete the journey in :-

- (a) 2 hours
- (b) 4 hours
- (c) 5 hours
- (d) $\frac{1}{2}$ hour?

4. A car travelled 60 kilometres.

If the journey only took 30 minutes, calculate the speed in km/hr.



Exercise 4

1. Copy and complete the formula to calculate the distance travelled :-

$$T = \frac{D}{\dots}$$

2. Use your formula to calculate the time taken for each of the following :-

- (a) A car travels 240 kilometres at 60 km/hr.
- (b) A jet travels 2000 miles at a speed of 500 m.p.h.
- (c) A cat running at 4 metres/sec and covers 26 metres.



3. Change the following times into hours and minutes :-

- (a) $3\frac{1}{2}$ hours
- (b) $4\frac{3}{4}$ hours
- (c) $2\frac{1}{3}$ hours
- (d) 6.25 hours.

4. Change the following times to decimal form :-

- (a) 1 hr 30 mins
- (b) 45 mins
- (c) 4 hrs 15 mins
- (d) 6 hrs 40 minutes.

5. Calculate the time taken (in hours and minutes) to :-

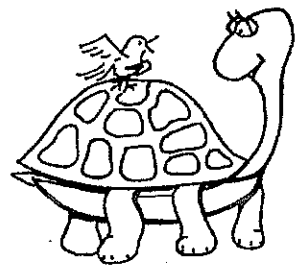
- (a) drive 120 km at 80 km/hr
- (b) run 20 miles at 8 m.p.h.
- (c) fly 1000 km at 300 km/hr
- (d) cruise 200 miles at 30 m.p.h.
- (e) race 400 km at 120 km/hr
- (f) walk 46 miles at 5 m.p.h.

Exercise 5

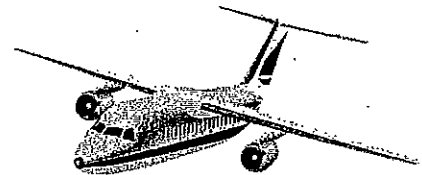
1. Find the unknown quantity in each of the following :-


- (a) Distance = ? km. Speed = 20 km/hr. Time : $3\frac{1}{2}$ hours.
- (b) Distance = 90 miles. Speed = ? m.p.h. Time : $1\frac{1}{2}$ hours.
- (c) Distance = 100 km. Speed = 40 km/hr. Time : ? hours.

- 2. (a) A tortoise walks at 2 metres per minute.
How long will it take to walk 9 metres ?
- (b) Addison can sprint at 4 metres per second.
How far will he travel in ten and a half seconds ?
- (c) A bus journey, 60 kilometres long, takes one and a half hours.
How fast is the bus travelling ?



- 3. A jet has a 400 mile journey to complete.
How long would it take at a speed of :-
(a) 200 m.p.h. (b) 800 m.p.h. (c) 600 m.p.h. ?



- 4.  Jane ran round a 1500 metre track and took 6 minutes.
(a) At what speed in metres per minute was Jane running ?
(b) Bob beat Jane's time by a minute.
What was Bob's speed ?

- 5. A rocket ship is 4200 km from Earth.
The rocket then travels away from Earth at its maximum speed of 2400 km/hr for $4\frac{1}{2}$ hours.
(a) How far away from Earth is the spaceship now ?
(b) How quickly can the spaceship then return to Earth, travelling at its maximum speed ?



- 6. Ryan cycled from home to school (8 km) at a speed of 16 km/hr.
He had to walk home from school due to a puncture.
If Ryan walked at a speed of 6 km/hr, how much quicker was he cycling than walking ?



Exercise 6

1. Change the following to decimals of an hour :-

- (a) 45 minutes (b) 24 minutes (c) 36 minutes (d) 27 minutes.

2. Change the following to decimals of a hour giving your answer to two decimal places :-

- (a) 7 minutes (b) 40 minutes (c) 8 minutes (d) 124 minutes.

3. Change each time to decimal form :-

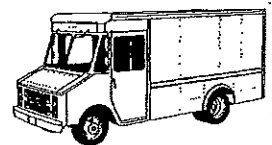
- (a) 2 hrs 33 mins (b) 1 hr 48 mins (c) 5 hrs 6 mins (d) 3 hrs 3 mins.



4. Calculate the unknown quantity in each of the following :-

- (a) Distance = ? km Speed = 80 km/hr Time : 2 hrs 45 mins.
 (b) Distance = 70 miles Speed = ? m.p.h. Time : 1 hr 24 mins.
 (c) Distance = 420 km Speed = 50 km/hr Time : ? hrs ? mins .

5. The distance between two towns Hurley and Burley is 48 kilometres. Gerry drives a truck from Hurley to Burley at a speed of 30 km/hr. On the return trip he increases his speed by 6 km/hr.



How much faster was the return trip ?

Exercise 7

1. Change the calculator displays (shown in hours) to hours and minutes :-

- (a)  (b)  (c) 

2. Change each of the following to hours and minutes :-

- (a) 4.6 hours (b) 8.15 hours (c) 3.05 hours (d) 1.125 hours.

3. Calculate the time taken in hours and minutes for the following journeys :-

- (a) A rally car travelling 150 kilometres at 40 km/hr.
 (b) A marathon runner (26 miles) at a speed of 12 m.p.h.
 (c) A speed boat at 40 km/hr travelling 36 kilometres.



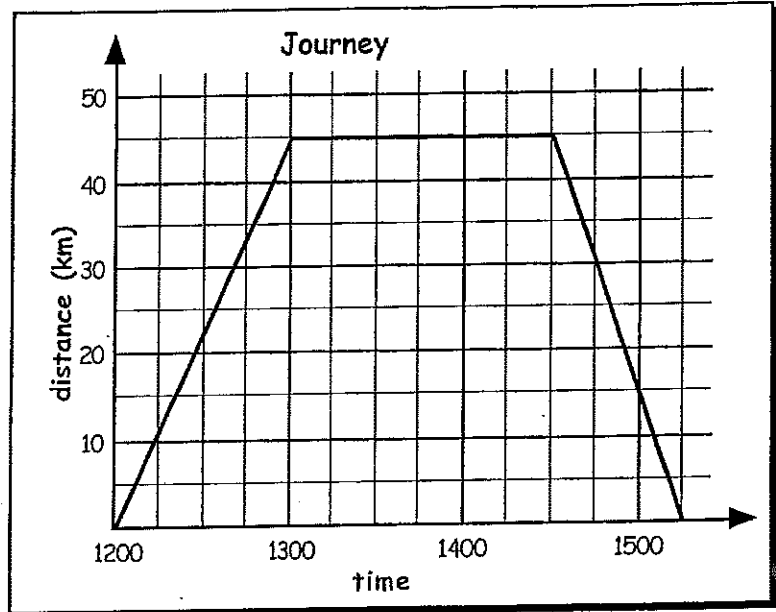
4. Change each of the following speeds to km/hr :-

- (a) 20 m/sec (b) 250 m/sec (c) 10.5 m/sec (d) 50 cm/min.

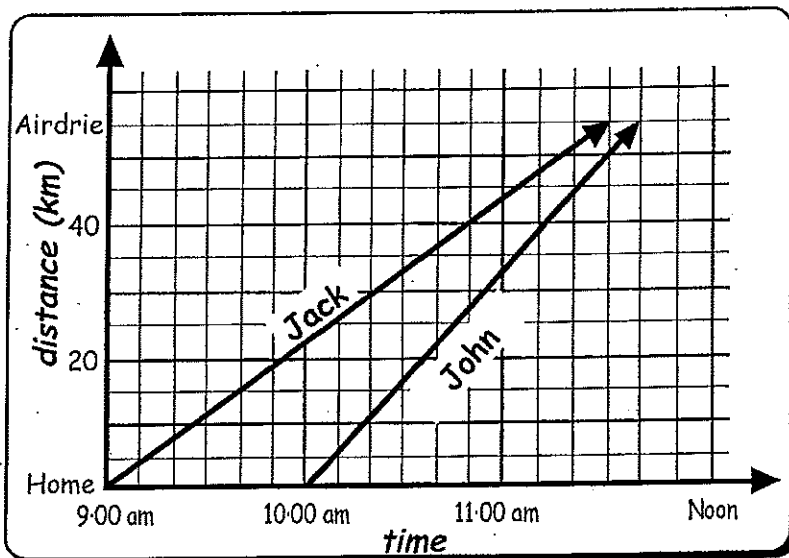
Exercise 8

1. The distance-time graph shows the journey Maggie made from her house to her favourite clothes shop and home again.

- (a) How long did the drive to the shop take ?
- (b) How far away is the shop from her house ?
- (c) How long did she stay at the shop ?
- (d) Calculate Maggie's speed :-
 - (i) going to the shop.
 - (ii) on the journey home.



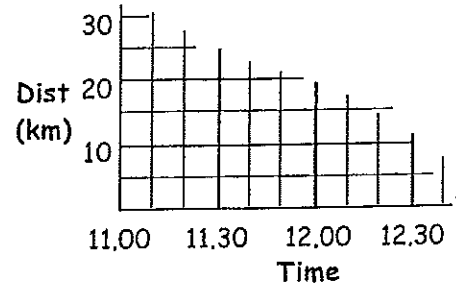
2. On Saturday, sisters Jackie and Gill both leave from home and drive to Airdrie.



- (a) At what time did each of the sisters leave their house ?
- (b) How far away is Airdrie from their house ?
- (c) Who arrived in Airdrie first and by how many minutes ?
- (d) Calculate the speed of each sister.
- (e) Jackie left Airdrie at Noon and drove home at 25 km/hr. Gill drove home at 30 km/hr.

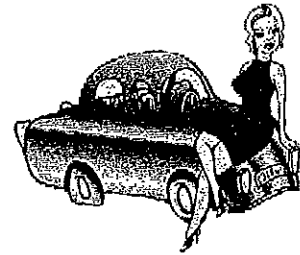
If both sisters arrived home at the same time, when must Gill have left Airdrie (to the nearest minute) ?

3. Billy set off at 11:00 am on Sunday and drove 50 miles to Edinburgh at an average speed of 40 mph. He shopped for 45 minutes in Edinburgh, then drove home at an average speed of 50 mph.



Show Billy's journey on a Distance - Time graph.

4. Helen left home at ten past nine, driving at a speed of 60 km/hr, but found she had a puncture after just 20 km. It took her 40 minutes to get the puncture repaired and she then drove straight back home at 50 km/hr. Show this journey on a Distance - Time graph.



Revision Exercise

1. Choose the appropriate formula and show all working in each of the following :-

- (a) Pauline drove 300 kilometres at 60 km/hr. How long did she take ?
- (b) Arnie flew at 120 m.p.h. for 4 hours. How far had Arnie flown ?
- (c) Kevin took 4 hours to cycle 60 kilometres. How fast was he cycling ?



2. Change each of the following times to decimals :-

- (a) 48 mins
- (b) 3 hrs 12 mins
- (c) 1 hr 42 mins.

3. Change each time to hours and minutes :-

- (a) 2.25 hours
- (b) 0.45 hours
- (c) 5.05 hours.

4. (a) Fred takes three quarters of an hour to drive 42 km to work.

What is Fred's average speed ?

- (b) Jeri drives at 80 km/hr and takes 1 hour and 12 minutes to get to work.

How far does Jeri drive to work ?

- (c) Terry the tortoise takes 40 minutes to crawl 16 metres.
Sally Slug slithers 900 centimetres in 30 minutes.

How much faster is Terry than Sally ?

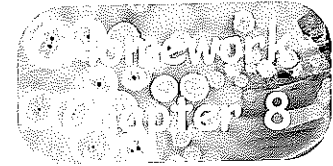


5. Last Sunday, Chelsea left home at Noon and cycled 20 kilometres to her office. She arrived at 1:20 pm and spent 10 minutes collecting the papers she had forgotten. She then cycled home and arrived at 2 pm.

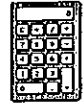
(a) Show all the given information on a distance-time graph.

(b) Calculate the speed of her journey :- (i) to the office (ii) home.

Topic 5



Exercise 1



- John and Rhona put their combined savings of £6 000 into THE REGAL BANK where there is an annual interest rate of 4%.
How much interest do they receive after 1 year?
- Some friends compare the interest they are due from various banks and building societies for 1 year.
 - Dave left £4 500 for a year. Rate = 5% p.a.
 - George deposited £10 500 for a year. Rate = 3.5% p.a.
 - Jemma banked £15 200 for a year. Rate = 5.5% p.a.
 - Mary invested £7 120 for a year. Rate = 4.2% p.a.
 Calculate how much interest each person was due.
- Tina invested £3 800 in a special savings account at her bank for 1 year. The annual interest rate is 4.2%.
Her friend Peter saved £4 300 in his building society account for 1 year and received a rate of 3.9% per annum.
Which of the two received more interest in total after 1 year?
- Doreen deposited £8 250 in her building society account for 1 year when the annual interest rate was 2.5%.
 - Calculate her interest after 1 year.
 - How much did she have then in her bank account?
- Decide what "RATE" of interest each of the following is due with the Greenwich Bank and calculate the amount of interest due after 1 year :-
 - Dino has £1 500 to invest for 1 year.
 - Dana has £14 250 to invest for 1 year.

GREENWICH BANK

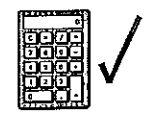
*"The more you put in -
The better the rate"*

up to £1000	- 2.5%
£1000 - £10000	- 2.8%
over £10000	- 3.4%

6. Wilma decides to invest £4800 with Eastern Building Society where there is an annual interest rate of 5%.
 - (a) How much interest should she expect if she leaves her money for 1 year ?
 - (b) How much does this work out at for 1 month ?
 - (c) How much interest is she due if she withdraws her savings after 6 months ?

7. Mr Johnston invests £10 500 with the Killie Building Society who have an annual interest rate of 3%.
 - (a) How much interest does he get if he leaves his money for 1 year ?
 - (b) How much does this work out at for 1 month ?
 - (c) How much interest does he get if he takes out his savings after 10 months ?

Exercise 2



1. Copy both of these bills and calculate the VAT and the overall bill in each case :-

(a)

BOBBY'S REMOVALS	
Vehicle Charge	= £100.50
Labour	= £225.50
Sub Total	= _____
+ VAT (17½%)	= <u> COPY </u>
Total Bill	= _____

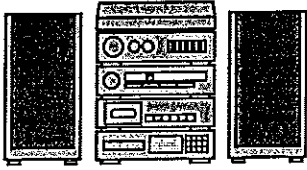
(b)

LOTHIAN LANDSCAPES	
Bedding Plants	= £63.50
Pots & Baskets	= £24.70
Labour (6 hrs at £15.50)	= £ _____
Sub Total	= _____
+ VAT (17½%)	= <u> COPY </u>
Total Bill	= _____

2. Calculate the cost of each of the following items :-

- (a) 40 metres of fencing at £2.20/metre. (+ VAT at 17½%)
- (b) A DVD player (£875) plus DVD (£25) (+ VAT at 17½%)
- (c) 5 new tyres at £62.80 each. (+ VAT at 17½%)
- (d) A set of golf clubs (£825.25) plus trolley (£45.75) (+ VAT at 17½%)
- (e) Driving lessons 15 @ £16.20 (+ VAT at 17½%)
- (f) 2 hours of a consultant's time at £425 per hour. (+ VAT at 17½%)

4.



Eric bought a mini Hi-Fi System for £120.

He sold it to a friend for £90.

- (a) How much of a loss did he make ?
- (b) Express this loss as a percentage of the cost price.

5. In each case here, calculate the (i) loss (ii) percentage loss :-

- (a) I bought a car for £5000 and later sold it for £3500.
- (b) I bought a laptop computer for £800 and later I sold it for £320.

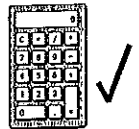


6. A garage bought a Rover from a customer for £3500 and a Mini from another customer for £2500.

They sold the Rover for £2900 and the Mini for £3700.

- (a) Did he make an "overall" profit or loss on the combined sale of the 2 cars ?
- (b) How much was his profit or loss ?
- (c) Express this as a percentage of the total cost price of the 2 cars.

Exercise 3

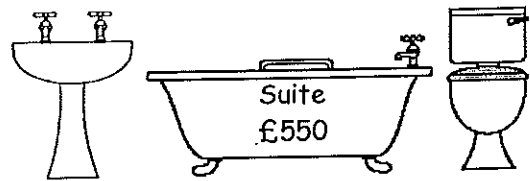


(Show all your working and set each question down carefully)

1. I bought a new bathroom suite from Turnballs.

I paid a deposit of £60.

This was followed by 12 monthly payments of £45.50 per month.

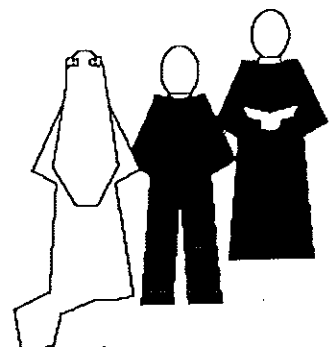


- (a) Calculate how much I paid in total using the Hire Purchase method. (show your three lines of working)
- (b) How much cheaper would it have been if I had paid cash ?

2. The hotel bill for my daughter's wedding came to £5500.

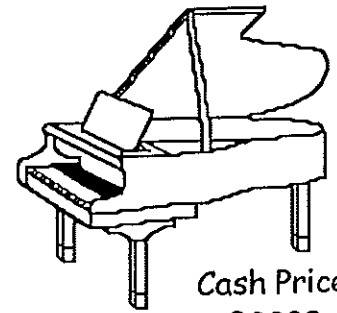
The hotel allowed me to pay it up using a Hire Purchase agreement.

I paid a deposit of £1000 and agreed to pay 36 monthly payments of £145.



- (a) How much did it cost me altogether on H.P. ?
- (b) How much could I have saved by paying cash ?

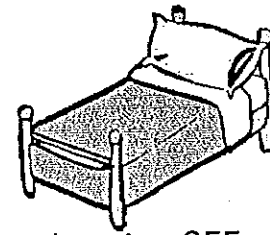
3. I bought a new baby grande piano from Biggars.
I took out a Hire Purchase agreement.
The deposit was 15% of the cash price.
I then made 18 monthly payments of £165 each.



Cash Price
£3200

- (a) How much did I pay for the piano altogether using H.P.?
(b) How much more was this than the cash price?

4. A new bed from the "BED SHED" costs £475.
I buy the bed using their Hire Purchase plan shown.



deposit - £55
+ 12 payments of £35

- (a) How much EXTRA does this cost me?
(b) Explain your answer.

Exercise 4

(Use the set of insurance rates shown opposite)

- Tommy and Rhona's flat is worth £58 000.
How much would it cost each year to insure it with Coverall?
- John and Alicia's bungalow is valued at £85 000.
How much would it cost each year to insure it with Coverall?
- Brian tallied up the value of the contents of his house and it came to a total of £8 000. How much will it cost each year to insure the contents for that value from Coverall?
- Malcolm and Lucille are moving abroad for 2 years. They sell their flat and put their furniture, valued at £14 000 into storage. How much will it cost them to insure their furniture with Coverall each year?
- Ted and Norma live in a detached villa valued at £180 000.
The entire contents of their house are to be insured for a value of £40 000.
 - How much will it cost each year to insure their house with Coverall?
 - How much will it cost each year to insure the contents?
 - They pay the TOTAL insurance premium in 12 monthly payments to Coverall. How much will they pay each month for their insurance?

COVERALL
Insurance Company

Annual Premium Rates

Building - £2.85 per £1000
Content - £4.75 per £1000



Calculators may be used in this chapter but the FRACTION BUTTON should NOT be used.

Exercise 5

1. Change each of these top heavy fractions to mixed numbers :-

(a) $\frac{15}{2}$

(b) $\frac{16}{3}$

(c) $\frac{42}{5}$

(d) $\frac{91}{20}$

(e) $\frac{25}{4}$

(f) $\frac{63}{8}$

(g) $\frac{122}{11}$

(h) $\frac{629}{25}$

2. Change each of the following to a mixed number and simplify where possible :-

(a) $\frac{30}{4}$

(b) $\frac{25}{10}$

(c) $\frac{131}{5}$

(d) $\frac{100}{15}$

(e) $\frac{305}{25}$

(f) $\frac{78}{8}$

(g) $\frac{1005}{25}$

(h) $\frac{100005}{100}$

3. Change each of the following mixed numbers to a top heavy fraction :-

(a) $3\frac{1}{2}$

(b) $4\frac{1}{3}$

(c) $7\frac{3}{5}$

(d) $10\frac{5}{6}$

(e) $7\frac{8}{9}$

(f) $5\frac{11}{12}$

(g) $10\frac{1}{50}$

(h) $15\frac{8}{15}$

4. How many $\frac{1}{4}$ litre glasses of juice can I get from :-

(a) 2 litres

(b) 10 litres

(c) $\frac{1}{2}$ litre

(d) $3\frac{3}{4}$ litres ?

Exercise 2

1. Copy each of the following and simplify (where possible) :-

(a) $\frac{1}{5} + \frac{3}{5}$

(b) $\frac{2}{7} + \frac{1}{7}$

(c) $\frac{5}{8} - \frac{2}{8}$

(d) $\frac{8}{11} - \frac{5}{11}$

(e) $\frac{4}{5} - \frac{3}{5}$

(f) $\frac{7}{8} - \frac{5}{8}$

(g) $\frac{1}{8} + \frac{3}{8}$

(h) $\frac{4}{10} + \frac{6}{10}$

2. Copy each and simplify :-

(a) $4\frac{1}{2} + 2\frac{1}{2}$

(b) $6\frac{1}{4} + 1\frac{1}{4}$

(c) $4\frac{3}{4} + 2\frac{3}{4}$

(d) $5\frac{7}{8} + \frac{5}{8}$

(e) $2\frac{3}{4} - 2\frac{1}{4}$

(f) $7\frac{5}{8} - 4\frac{3}{8}$

(g) $10\frac{7}{10} - 5\frac{3}{10}$

(h) $2\frac{13}{15} - 1\frac{8}{15}$

3. Tom walked for $\frac{3}{8}$ of a kilometre, rested, and then walked another $\frac{1}{8}$ kilometres.

How far had Tom walked in total ?

4. Jerry mixed $2\frac{3}{4}$ kg's of currants and $1\frac{1}{4}$ kg's of raisins into a bowl.

What is the total weight of currants and raisins?



5. Bill jogged $5\frac{3}{4}$ km of an eight kilometre run.

How far has Bill still to jog?

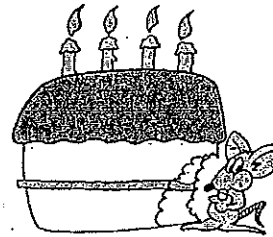


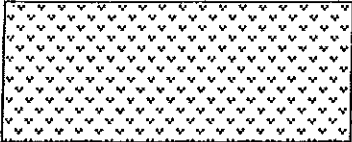
6. At a birthday party, Ann drank $1\frac{1}{4}$ litres of punch,

Alec drank $2\frac{1}{4}$ litres and Jim drank $\frac{3}{4}$ of a litre.

(a) How much punch did they drink altogether.

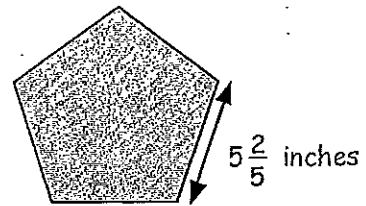
(b) How much punch was left from a 6 litre bowl?



7.  A rectangular garden measures $7\frac{3}{5}$ metres by $4\frac{4}{5}$ metres.
Find the perimeter of the garden.

8. An regular pentagonal garden slab has side $5\frac{2}{5}$ inches.

Find the perimeter of the slab.



Exercise 6

1. Copy and complete each of the following calculations and simplify where possible :-
(Remember - denominators must be the same to add or subtract)

(a) $\frac{1}{2} + \frac{1}{8}$	(b) $\frac{2}{3} + \frac{1}{6}$	(c) $\frac{3}{4} - \frac{5}{12}$	(d) $\frac{5}{16} - \frac{1}{4}$
(e) $\frac{7}{10} + \frac{3}{5}$	(f) $\frac{5}{6} - \frac{7}{12}$	(g) $\frac{9}{16} + \frac{3}{4}$	(h) $\frac{9}{51} - \frac{3}{17}$
(i) $\frac{2}{3} + \frac{1}{2} + \frac{1}{4}$	(j) $\frac{5}{12} + \frac{1}{4} - \frac{1}{2}$	(k) $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5}$	

2. Copy and simplify :-

(a) $3\frac{1}{2} + 1\frac{1}{3}$	(b) $1\frac{1}{3} + 3\frac{1}{4}$	(c) $4\frac{1}{2} + 1\frac{2}{5}$	(d) $4\frac{1}{2} - 1\frac{2}{5}$
(e) $6\frac{7}{8} - 4\frac{3}{4}$	(f) $1\frac{3}{5} - \frac{7}{15}$	(g) $4\frac{9}{10} - 3\frac{3}{4}$	(h) $4\frac{9}{10} + 3\frac{3}{4}$

3. Copy and simplify :-

(a) $5 - 2\frac{2}{3}$	(b) $8 - 4\frac{4}{7}$	(c) $4\frac{1}{2} - 2\frac{3}{4}$	(d) $7\frac{3}{8} - 1\frac{1}{2}$
(e) $3\frac{1}{6} - 1\frac{4}{5}$	(f) $11\frac{1}{3} - 9\frac{1}{2}$	(g) $8\frac{2}{5} - 1\frac{2}{3}$	(h) $1\frac{1}{4} - \frac{2}{5}$

Exercise 7

1. Copy and complete each calculation (simplifying where possible) :-

(a) $\frac{2}{3} \times \frac{5}{7}$

(b) $\frac{1}{2} \times \frac{3}{5}$

(c) $\frac{3}{4} \times \frac{7}{8}$

(d) $\frac{5}{8} \times \frac{2}{3}$

(e) $\frac{7}{8} \times \frac{1}{14}$

(f) $\frac{2}{3} \times \frac{15}{16}$

(g) $\frac{7}{10} \times \frac{5}{14}$

(h) $\frac{5}{4} \times \frac{8}{15}$

2. Simplify :-

(a) $2\frac{1}{4} \times 3\frac{1}{2}$

(b) $4\frac{2}{3} \times 3\frac{1}{2}$

(c) $2\frac{3}{4} \times 3\frac{1}{2}$

(d) $1\frac{2}{5} \times 2\frac{3}{5}$

(e) $5\frac{4}{5} \times 1\frac{2}{3}$

(f) $1\frac{1}{7} \times 2\frac{4}{5}$

(g) $1\frac{4}{9} \times 4\frac{1}{2}$

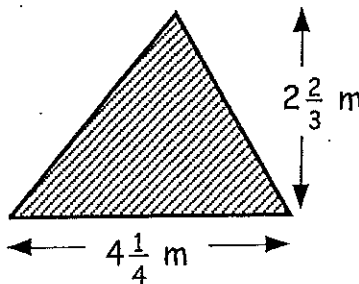
(h) $5\frac{3}{5} \times \frac{6}{7}$

3. A large rectangular metal sheet has dimensions $2\frac{2}{5}$ metres by $3\frac{3}{4}$ metres.

Calculate the area of the metal sheet.

4. A triangle has dimensions as shown.

Calculate the area of the triangle.



Exercise 8

1. Copy and complete each calculation (simplifying where possible) :-

(a) $\frac{3}{5} \div \frac{3}{4}$

(b) $\frac{4}{5} \div \frac{2}{15}$

(c) $\frac{1}{8} \div \frac{1}{4}$

(d) $\frac{4}{9} \div \frac{4}{15}$

(e) $\frac{7}{11} \div \frac{7}{22}$

(f) $\frac{8}{15} \div \frac{2}{3}$

(g) $\frac{11}{36} \div \frac{22}{24}$

(h) $\frac{10}{33} \div \frac{25}{36}$

2. Copy and complete :-

(a) $6\frac{2}{3} \div 2\frac{1}{2}$

(b) $4\frac{1}{5} \div 3\frac{1}{2}$

(c) $1\frac{5}{7} \div 1\frac{1}{5}$

(d) $1\frac{2}{3} \div 2\frac{2}{9}$

(e) $4\frac{4}{5} \div 1\frac{1}{15}$

(f) $1\frac{1}{2} \div 1\frac{3}{7}$

(g) $5\frac{2}{5} \div 6\frac{2}{5}$

(h) $2\frac{5}{8} \div 1\frac{2}{5}$

3. A sack of potatoes weighs $12\frac{5}{8}$ kg.

The sack has to be emptied into bags each weighing $2\frac{1}{4}$ kg.

(a) How many full bags can be filled from the sack?

(b) What weight of potatoes is left?

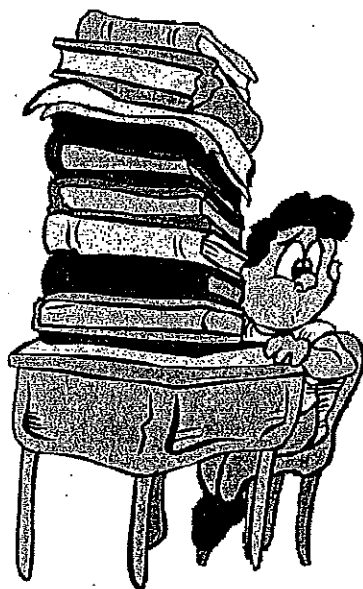


4. A twenty metre length of rope is cut into $1\frac{5}{8}$ metre pieces.

How much of the rope would be left over?

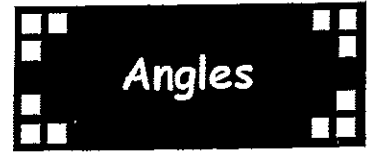
Revision Exercise

1. Change to a mixed number :- (a) $\frac{22}{7}$ (b) $\frac{83}{3}$
2. Change to a top heavy fraction :- (a) $4\frac{1}{4}$ (b) $10\frac{2}{9}$
3. Copy and complete :-
- (a) $\frac{2}{5} + \frac{1}{5}$ (b) $\frac{4}{5} + \frac{2}{3}$ (c) $\frac{8}{9} - \frac{2}{3}$ (d) $\frac{4}{5} - \frac{3}{8}$
- (e) $2\frac{4}{5} + 3\frac{3}{4}$ (f) $1\frac{1}{7} + \frac{3}{5}$ (g) $5\frac{2}{3} - 3\frac{3}{5}$ (h) $5\frac{1}{3} - 2\frac{3}{4}$
4. Copy and complete :-
- (a) $\frac{4}{9} \times \frac{7}{8}$ (b) $\frac{2}{3} \times \frac{9}{16}$ (c) $2\frac{1}{3} \times 1\frac{1}{5}$ (d) $5\frac{5}{6} \times 1\frac{3}{7}$
- (e) $\frac{5}{6} \div \frac{2}{3}$ (f) $\frac{7}{9} \div \frac{2}{3}$ (g) $\frac{15}{7} \div \frac{5}{14}$ (h) $3\frac{5}{9} \div 2\frac{2}{3}$
5. A rectangle has length $4\frac{2}{3}$ metres and breadth $2\frac{1}{4}$ metres.
Calculate the area of the rectangle.
6. A rectangle has an area of $8\frac{3}{4}$ metres.
If the rectangle has length $5\frac{5}{6}$ metres, find the breadth.





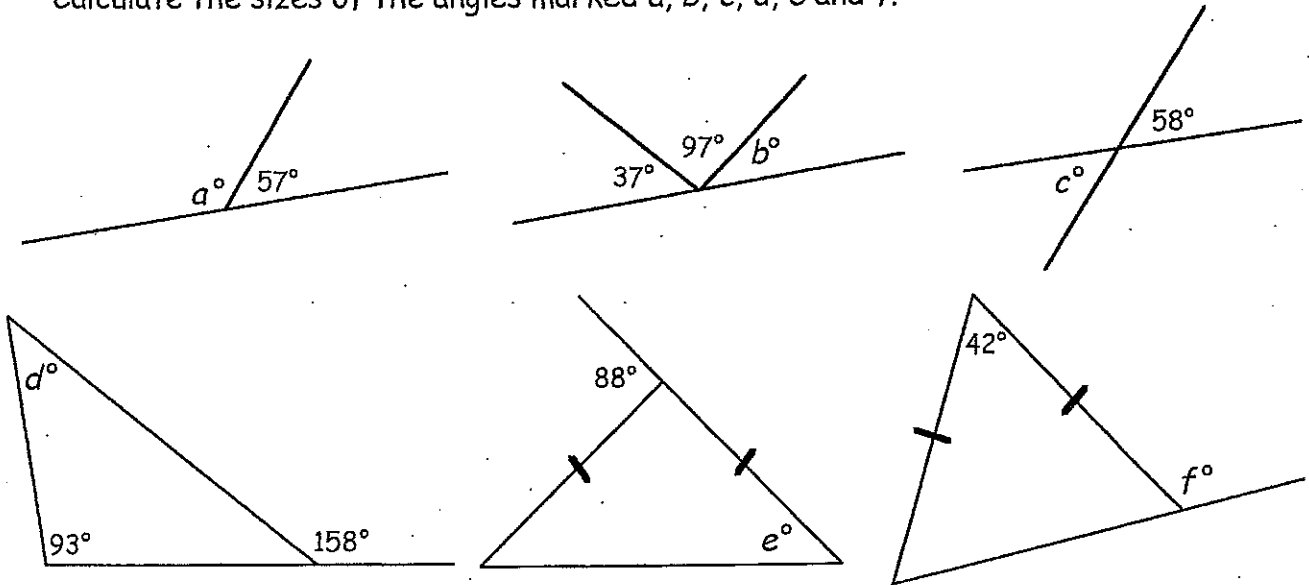
Topic 6



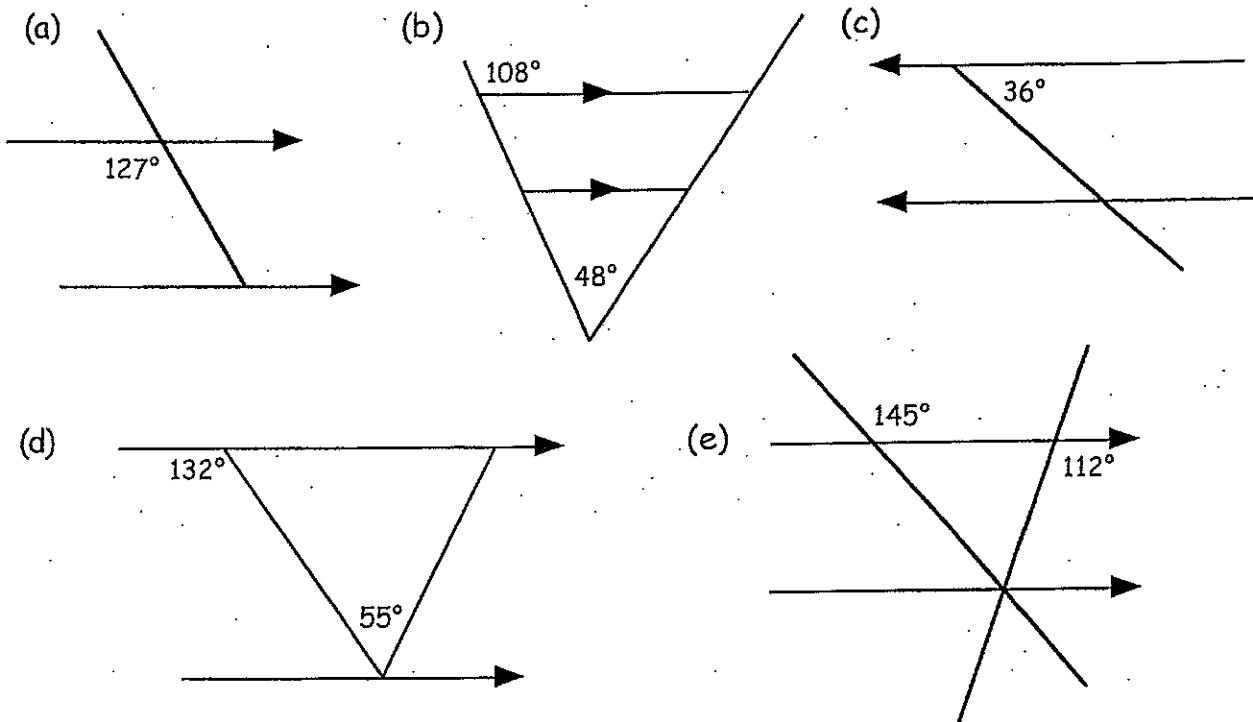
Exercise 1



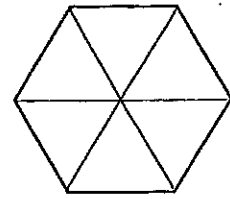
1. Calculate the sizes of the angles marked a , b , c , d , e and f .



2. COPY each of the following and fill in the sizes of all the missing angles :-



Exercise 2



1. What is the name of a regular polygon which has :-

- (a) 5 sides (b) 6 sides (c) 7 sides
 (d) 8 sides (e) 9 sides (f) 10 sides ?

2. The formula for finding the interior angles of a regular polygon, given the number of sides (n), is :-

$$\text{interior angle} = 180 - (360 \div n).$$

Use the formula to find the size of the interior angles of a regular :-

- (a) pentagon (b) nonagon (c) 20 sided polygon.

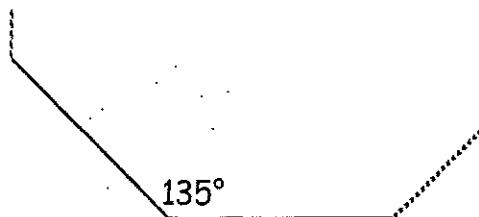
3. The formula shown below is used to calculate the size of the exterior angles of a regular polygon.

$$\text{exterior angle} = 180^\circ - \text{interior angle}$$

Use the above formula to calculate the size of the exterior angle of :-

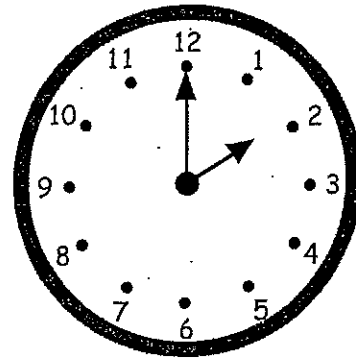
- (a) a regular pentagon.
 (b) a regular nonagon.
 (c) a regular decagon.

4. (a) An interior angle of a regular polygon is found to be 135° .
 What is the regular polygon called ?

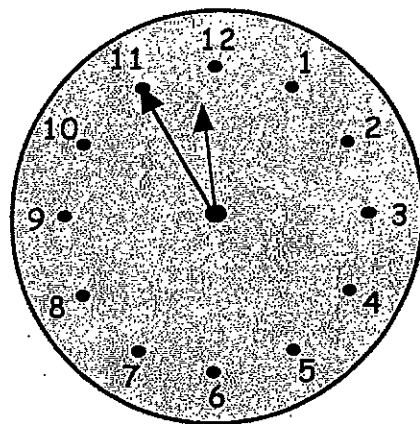


(b) An exterior angle of a regular polygon is found to be 60° .
 What is the regular polygon called ?

Exercise 3



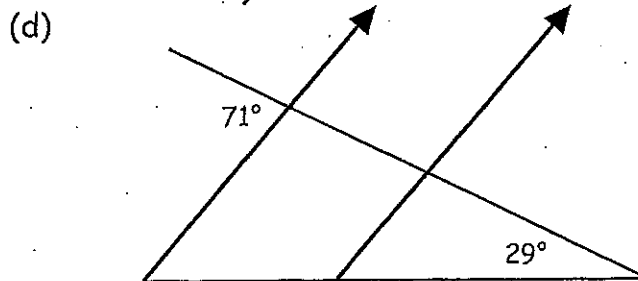
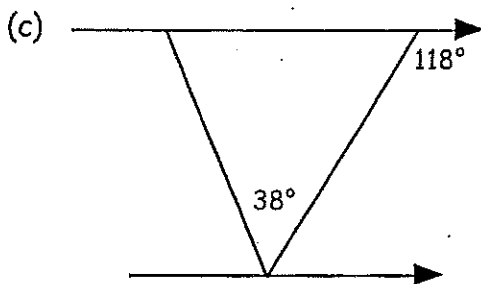
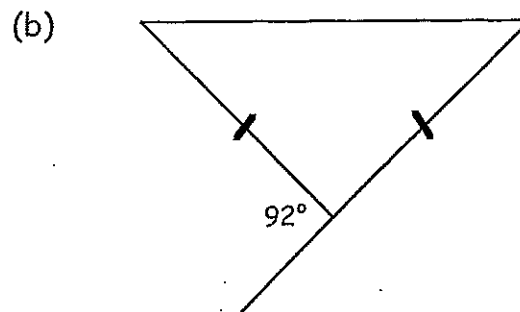
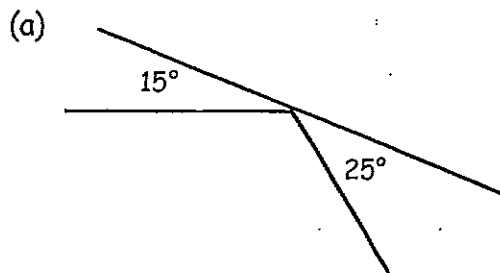
- How many degrees are there in 1 full turn?
 - How many hours are there on the face of this clock?
 - What is the size of the angle between the 12 and the 2 on this clock?
- What is the size of the (smaller) angle between the hands of a clock at :-
 - 1 o'clock
 - 3 o'clock
 - 7 o'clock
 - 8 o'clock
 - 9 o'clock
 - 11 o'clock?
- Calculate the size of the (smaller) angle between the hands of a clock at :-
 - half past four
 - half past 10
 - 1.30
 - 11.30
 - half past 9
 - 8.30.
- Calculate the size of the acute angle between the hands of a clock at :-
 - quarter past 4
 - quarter past 6.
- Calculate the size of the acute angle between the hands of a clock at 5 minutes to midnight.
(Difficult I)



Revision Exercise



1. COPY each of the following and fill in the sizes of all the missing angles :-



2. How many sides has a regular :-

- (a) pentagon (b) heptagon (c) nonagon ?

3. Calculate the size of the interior angles of a regular :-

- (a) hexagon (b) octagon (c) decagon.

4. Calculate the size of the exterior angles of a regular :-

- (a) pentagon. (b) duodecagon (12 sides). (c) 20 sided polygon.

5. (a) An interior angle of a regular polygon is found to be 108° .

What is the regular polygon called ?

(b) An exterior angle of a regular polygon is found to be 120° .

What is the regular polygon called ?

6. What is the size of the (smaller) angle between the hands of a clock at :-

- (a) 4 o'clock (b) 5 o'clock (c) 10 o'clock
 (d) half past three (e) 7.30 (f) 10.30
 (g) quarter to eight (h) quarter past twelve ?



Calculators should not be used anywhere in this Chapter unless you are otherwise instructed.

Exercise 1

1. Find :-

- | | | | | |
|-----------------------|-----------------------|-----------------------|---------------|----------------|
| (a) 3^2 | (b) 5^2 | (c) 2^2 | (d) 1^2 | (e) 10^2 |
| (f) 9^2 | (g) 11^2 | (h) 12^2 | (i) 20^2 | (j) 100^2 |
| (k) $(\frac{1}{2})^2$ | (l) $(\frac{1}{3})^2$ | (m) $(\frac{1}{5})^2$ | (n) $(0.1)^2$ | (o) $(0.01)^2$ |

2. Calculate the area of a square with side :-

- | | | | | |
|----------|-----------|----------|-----------|-----------|
| (a) 5 cm | (b) 10 cm | (c) 7 mm | (d) 0.5 m | (e) 1 km. |
|----------|-----------|----------|-----------|-----------|

Exercise 2

1. Find :-

- | | | | | |
|------------------|--------------------|------------------|-------------------|----------------|
| (a) $\sqrt{36}$ | (b) $\sqrt{25}$ | (c) $\sqrt{100}$ | (d) $\sqrt{169}$ | (e) $\sqrt{4}$ |
| (f) $\sqrt{225}$ | (g) $\sqrt{10000}$ | (h) $\sqrt{900}$ | (i) $\sqrt{1600}$ | (j) $\sqrt{1}$ |

2. Use a calculator and write down to two decimal places :-

- | | | | | |
|-----------------|-----------------|-----------------|------------------|-------------------|
| (a) $\sqrt{20}$ | (b) $\sqrt{50}$ | (c) $\sqrt{56}$ | (d) $\sqrt{179}$ | (e) $\sqrt{14.4}$ |
|-----------------|-----------------|-----------------|------------------|-------------------|

3. Calculate the length of the side of a square with area :-

- | | | | | |
|-----------------------|-----------------------|---------------------|----------------------|------------------------|
| (a) 49 cm^2 | (b) 81 cm^2 | (c) 9 m^2 | (d) 1 mm^2 | (e) 0.25 m^2 |
|-----------------------|-----------------------|---------------------|----------------------|------------------------|

Exercise 3 & 4

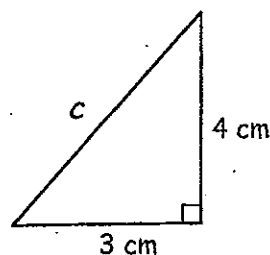
1. Use Pythagoras' Rule to calculate the length of the hypotenuse in this triangle :-

$$\Rightarrow c^2 = a^2 + b^2$$

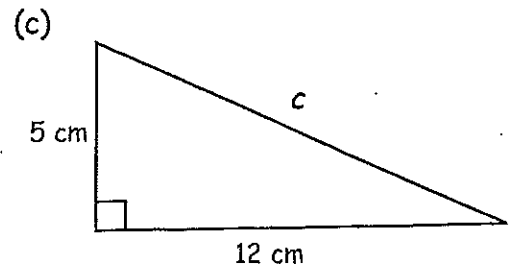
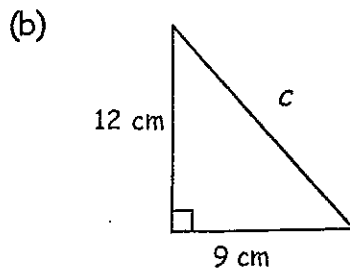
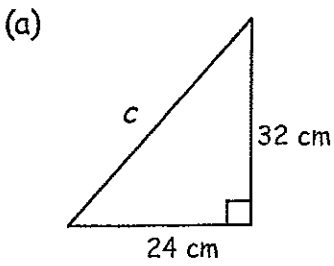
$$\Rightarrow c^2 = 3^2 + \dots$$

$$\Rightarrow c^2 = 9 + \dots = \dots$$

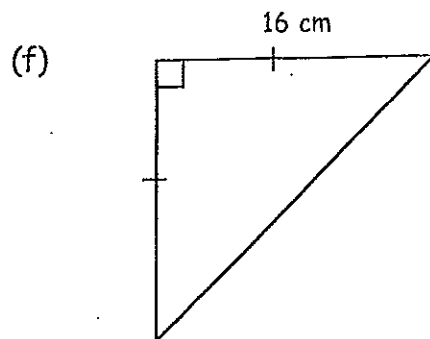
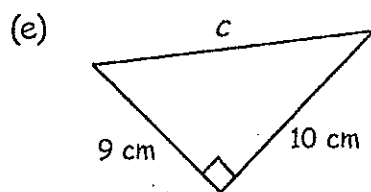
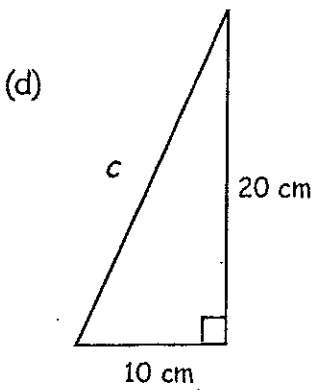
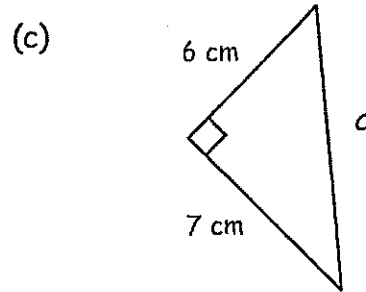
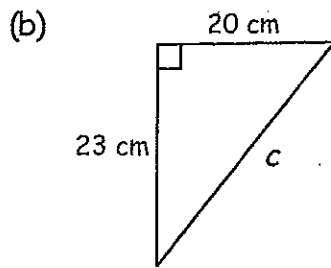
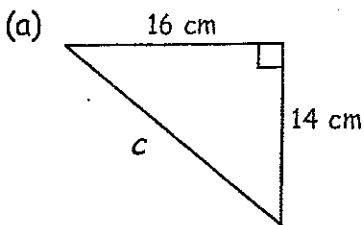
$$\Rightarrow c = \sqrt{\dots} = \dots \text{ cm}$$



2. For each right angled triangle shown, use Pythagoras' Theorem to calculate the length of each hypotenuse :-



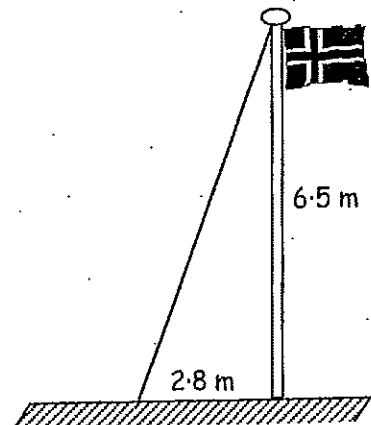
3. For each right angled triangle shown, use Pythagoras' Theorem to calculate the length of each hypotenuse (correct to two decimal places) :-



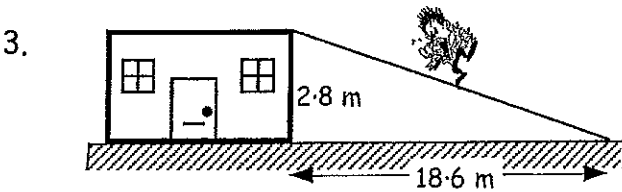
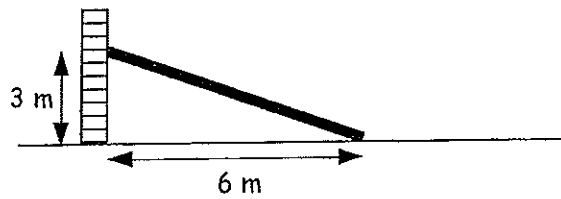
Exercise 5

(In this exercise, round all answers to two decimal places where necessary).

1. A metal wire is attached to the top of a flagpole to help keep it rigid. Calculate the length of the metal wire. (Hint : Use Pythagoras Theorem).

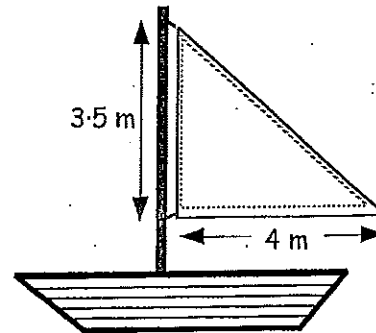


2. A long wooden beam is required to prop up a wall which is deemed unsafe.
How long is the required beam ?

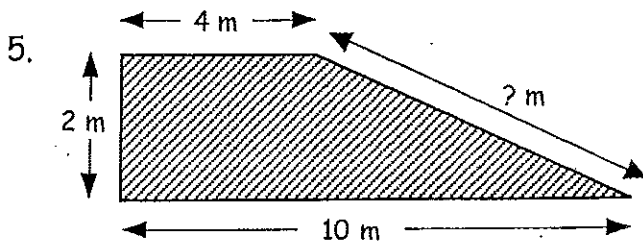


A tightrope walker is to walk from a roof-top to the ground along a rope.
Calculate the length of the rope.

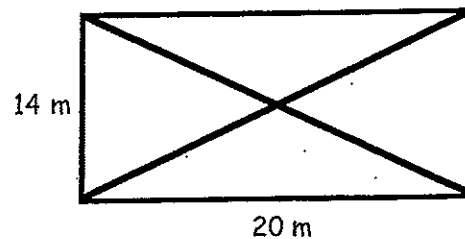
4. A coloured strip is to be stitched around the outside of the sail of a yacht.
Find the total length of strip needed.



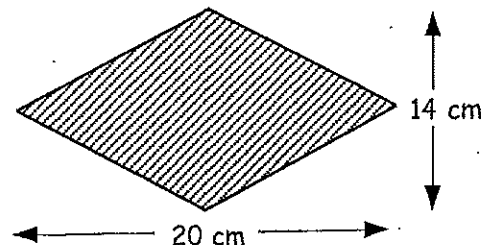
A skateboard ramp has dimensions as shown.
Calculate the length of the sloping side of the ramp.



6. Lines are to be painted in the shape of a large rectangle with its diagonals included.
(a) Calculate the length of one diagonal ?
(b) What is the total length of the lines requiring to be painted ?



7. A rhombus has its diagonal lengths 20 centimetres and 14 centimetres.
Calculate the perimeter of the rhombus.



8. A ship sets out from Port and sails 20 kilometres due West then 15 kilometres due North.

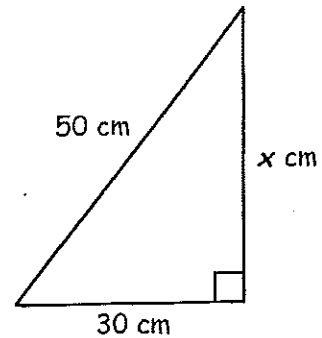
The ship develops engine trouble and must return directly to Port.
How far will the ship have to sail to go directly back to Port ?

(A sketch will help you !)

Exercise 6

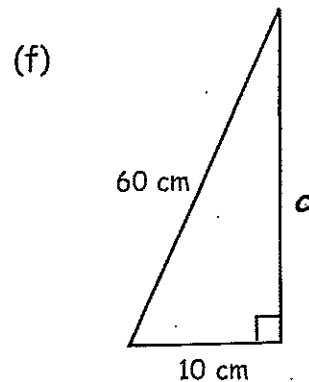
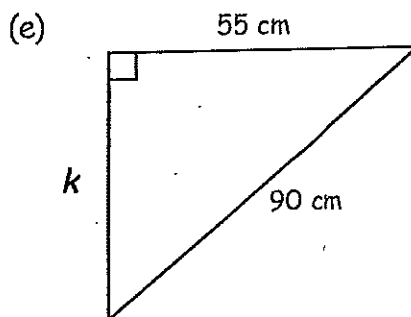
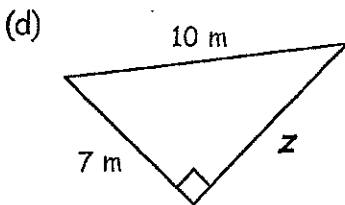
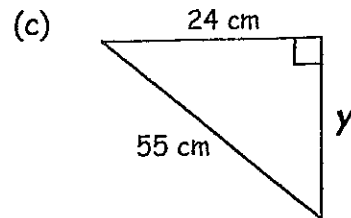
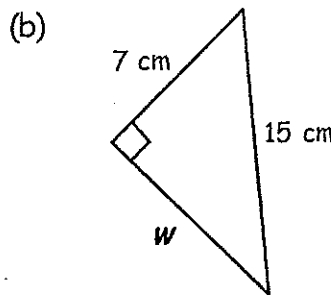
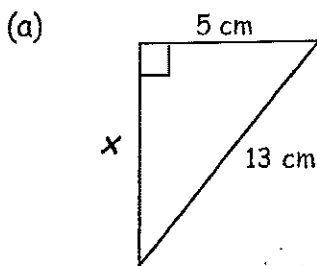
1. COPY and complete the calculation to find the length side marked x.

$$\begin{aligned} a^2 &= c^2 - b^2 \\ \Rightarrow x^2 &= 50^2 - 30^2 \\ \Rightarrow x^2 &= 2500 - 900 \\ \Rightarrow x^2 &= 1600 \\ \Rightarrow x &= \dots \text{ cm} \end{aligned}$$

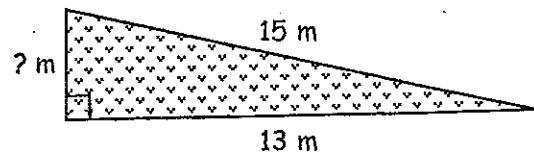


2. In each of the following right angled triangles, calculate the size of each unknown smaller side :-

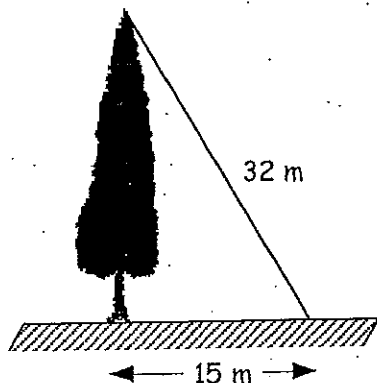
(Give your answer to two decimal places where necessary).



3. A triangular garden has dimensions as shown. Find the breadth of the garden.

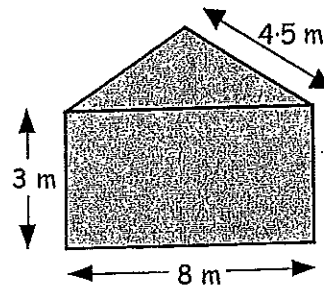


4.



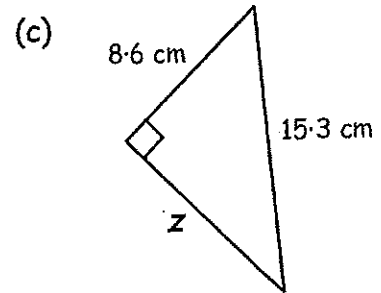
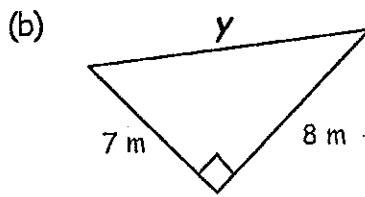
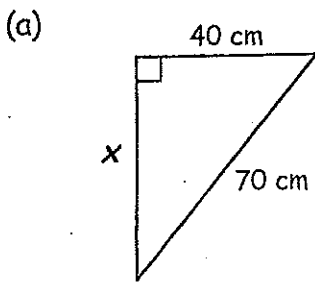
Calculate the height of the tree.

5. A house has dimensions as shown where the roof is in the shape of an isosceles triangle.
Find the total height of the house.

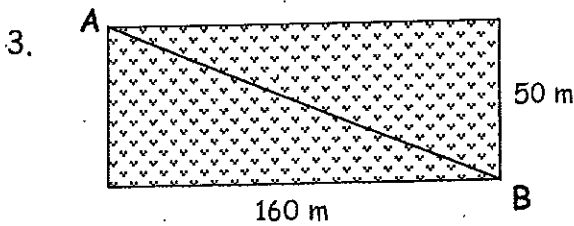
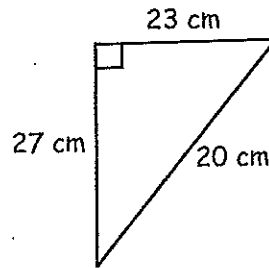


Exercise 7

1. For each question below, use an appropriate formula to find the values of x , y and z :-

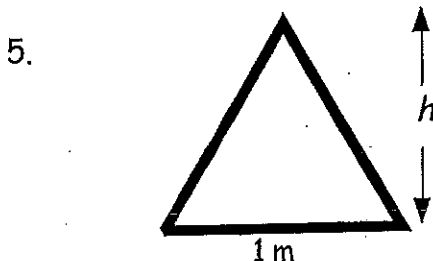
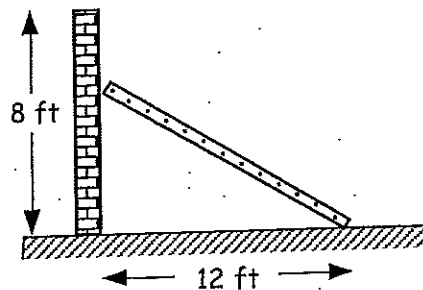


2. (a) What is wrong with the triangle shown?
(b) In fact, the length of the hypotenuse has been given incorrectly.
What should its length be?



A farmer has a path which runs diagonally across a rectangular field.
How much longer is it to walk around the outside of the field from A to B than walking across the pathway?

4. The top of a ladder is placed three quarters of the way up an eight foot high wall.
Find the length of the ladder.

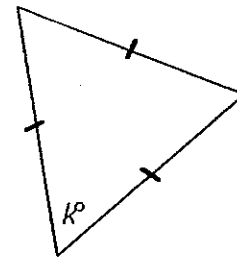
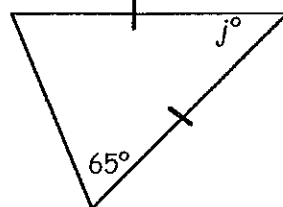
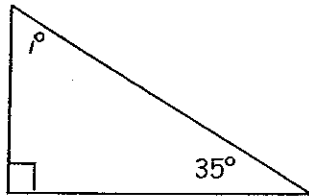
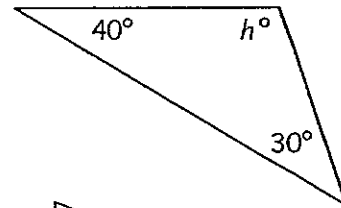
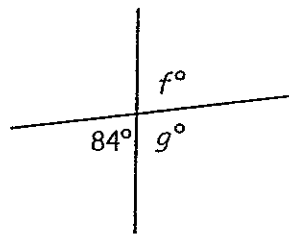
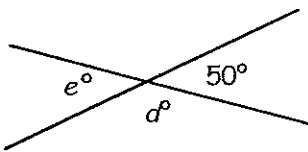
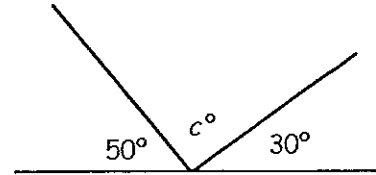
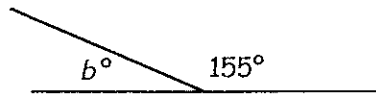
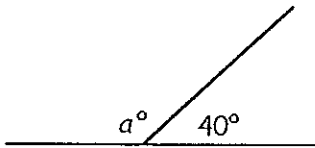


The road sign is in the shape of an equilateral triangle with side 1 metre.
Find the height of the sign (h metres).

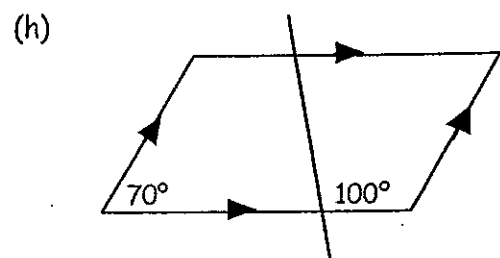
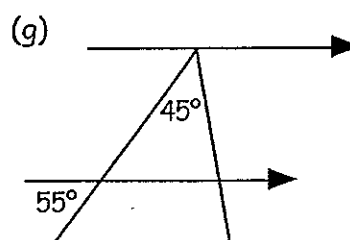
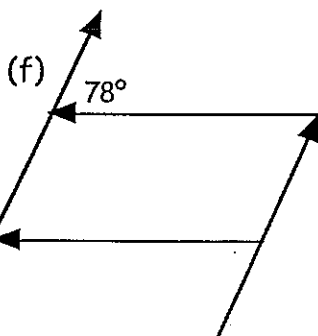
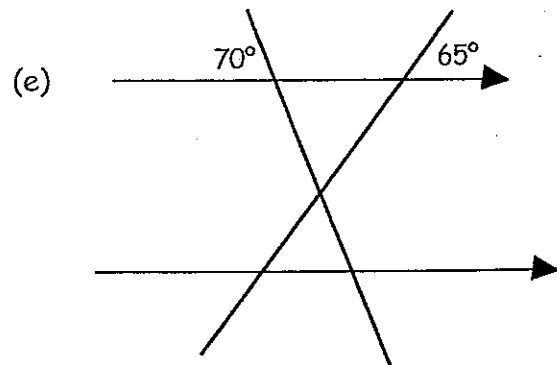
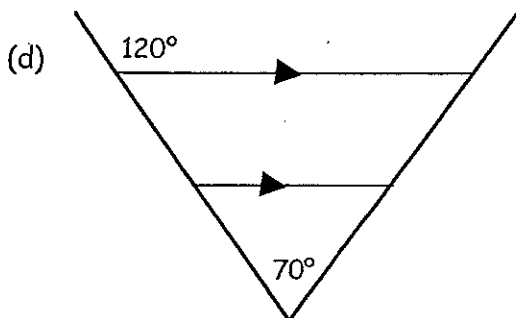
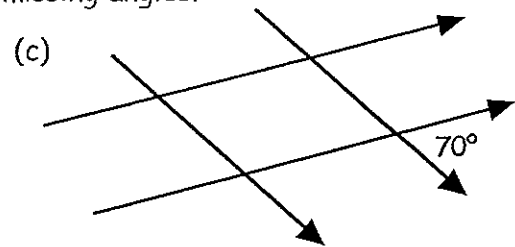
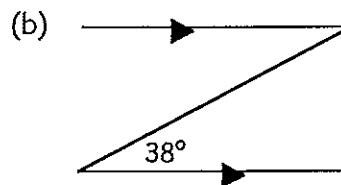
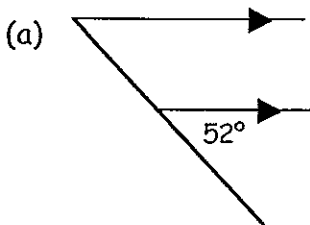
Chapter 12
Angle Properties

Exercise 1

1. Calculate the size of the angles marked a, b, c, \dots

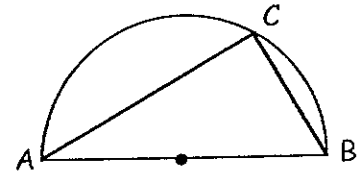


2. Copy each of the following and fill in the sizes of all the missing angles.

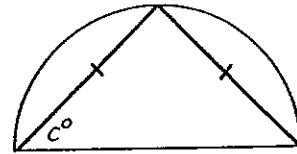
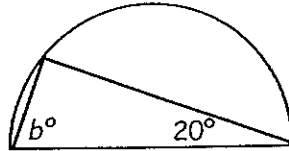
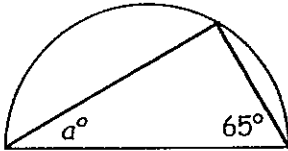


Exercise 2

1. Copy and complete:- "In a semi-circle, with AB as diameter, the size of $\angle ACB$ is always"



2. Calculate the sizes of the angles marked a, b, c .



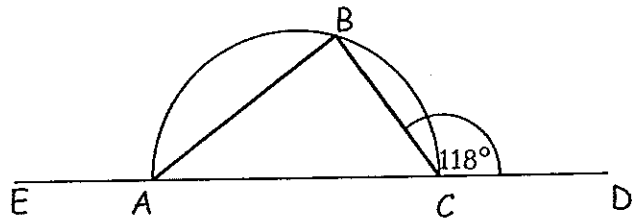
3. Angle DCB is 118° .

(a) Write down the size of :-

- (i) $\angle ACB$ (ii) $\angle CBA$

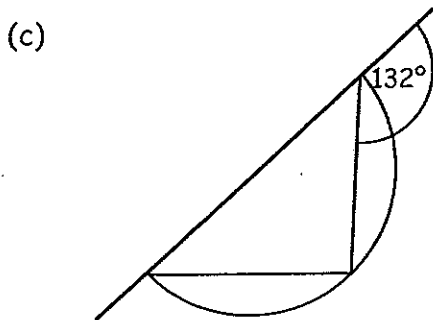
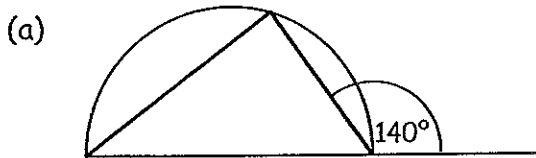
(b) Calculate :-

- (i) $\angle BAC$ (ii) $\angle BAE$



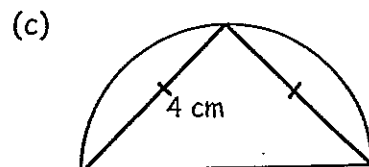
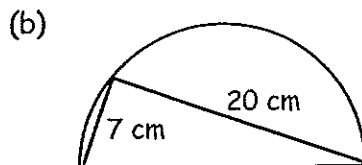
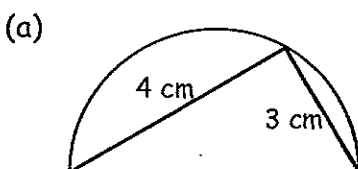
4. Sketch the following semi-circles (use a 2p coin if you need to).

In your sketches fill in the size of all the missing angles.

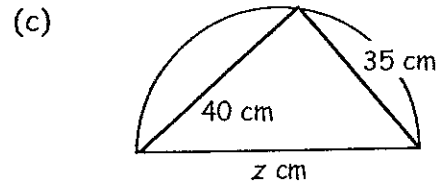
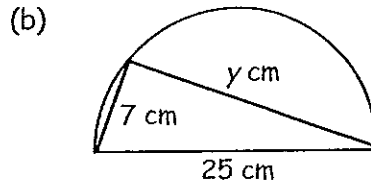
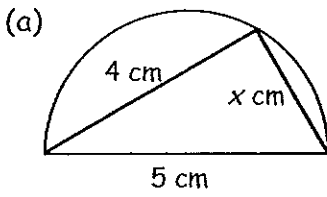


Exercise 3

1. Use Pythagoras' Theorem to calculate the size of the diameter of each of these semi-circles. (to 1 decimal place).

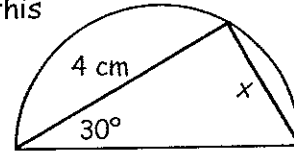


2. Use Pythagoras' Theorem to calculate the values of x , y and z .

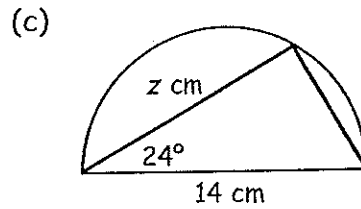
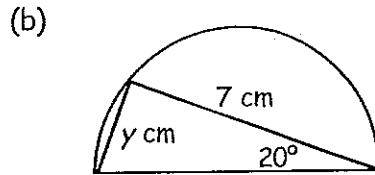
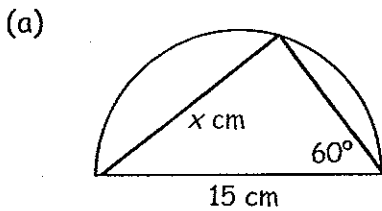


3. Use trigonometry to calculate the length of the side marked x in this semi-circular figure.

(Hint: $\tan 30^\circ = \frac{x}{4}$)

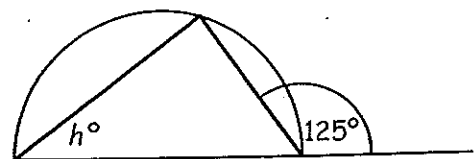
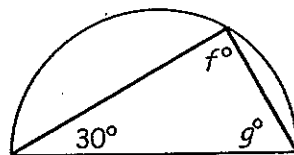
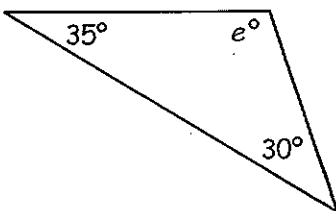
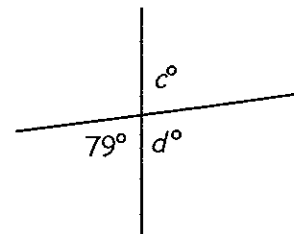
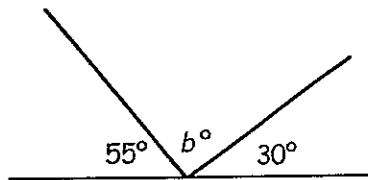
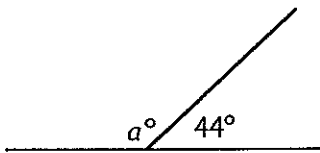


4. Use trigonometry to calculate the length of x , y and z .



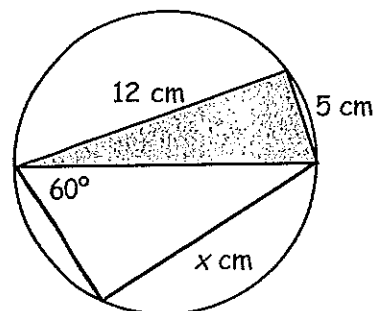
Exercise 4 Revision exercise

1. Write down the values of a , b , c , d ,



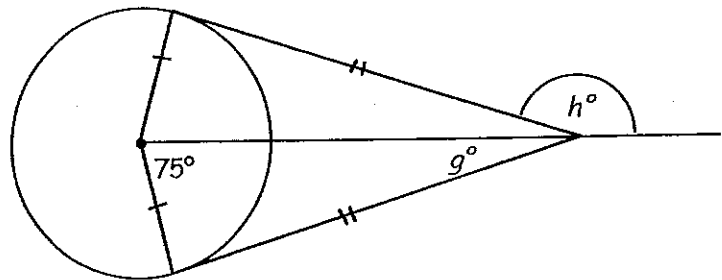
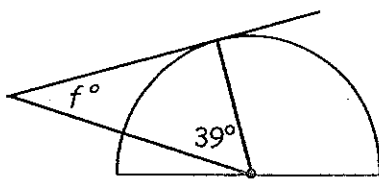
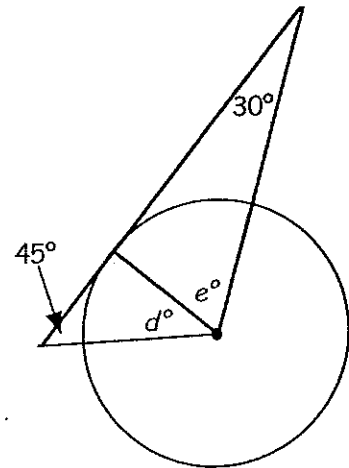
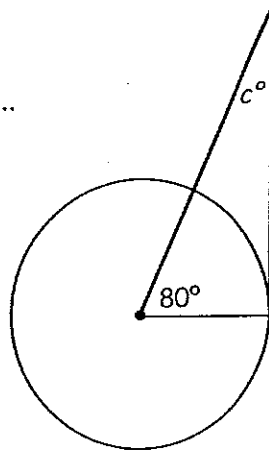
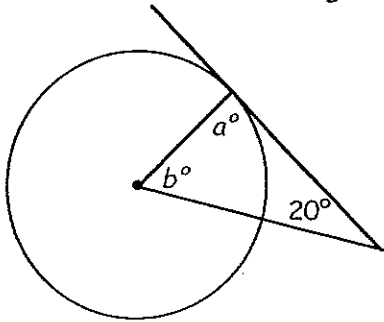
2. (a) Use Pythagoras' Theorem to calculate the diameter of the semi-circle.

(b) Use trigonometry to calculate the length of x .

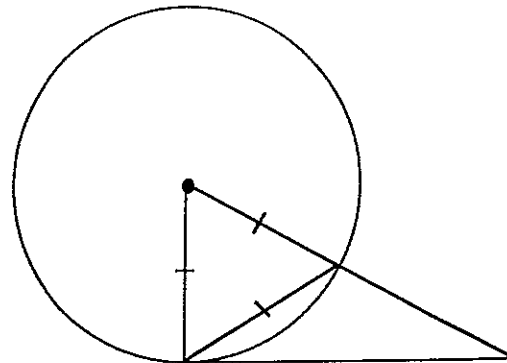


Exercise 5E

1. Write down the size of angles a , b , c , ...

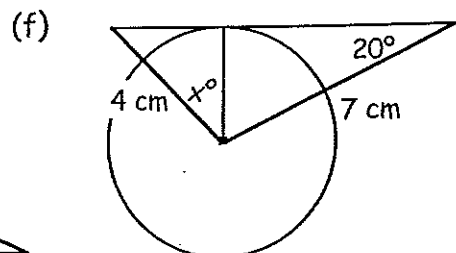
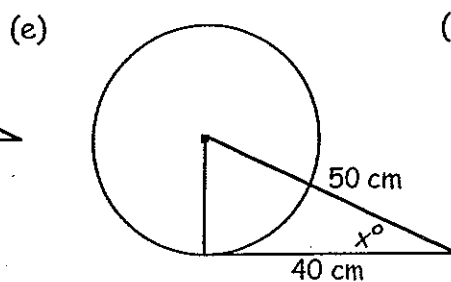
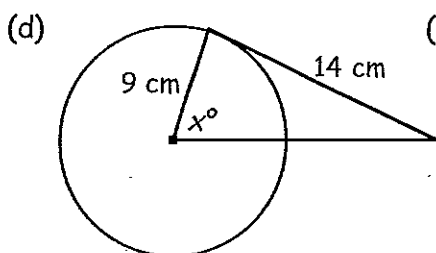
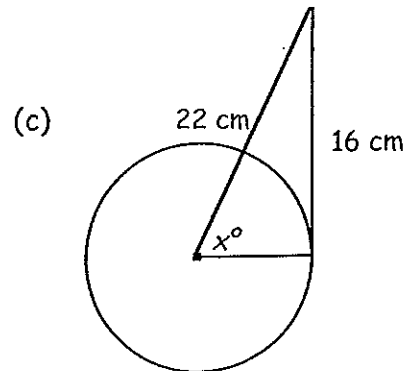
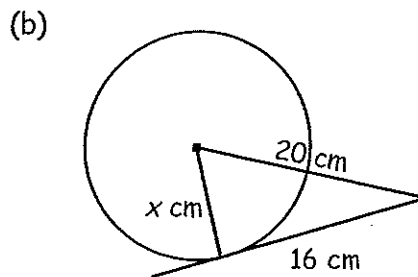
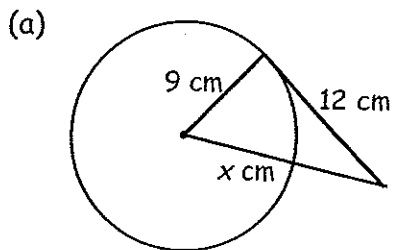


2. Make a large sketch of the diagram shown and fill in the sizes of all the angles.



Exercise 6E

1. Use Pythagoras or trigonometry to calculate x .

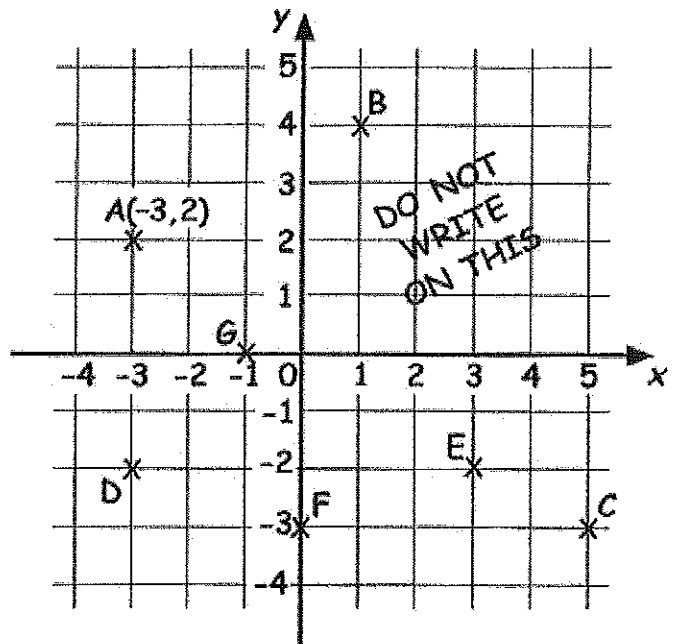


Topic 7

MNU 4-18a: I can plot and describe the position of a point on a 4-quadrant coordinate grid.

Exercise 1

1. The coordinates of A are $(-3, 2)$.
Write the coordinates of the other points.

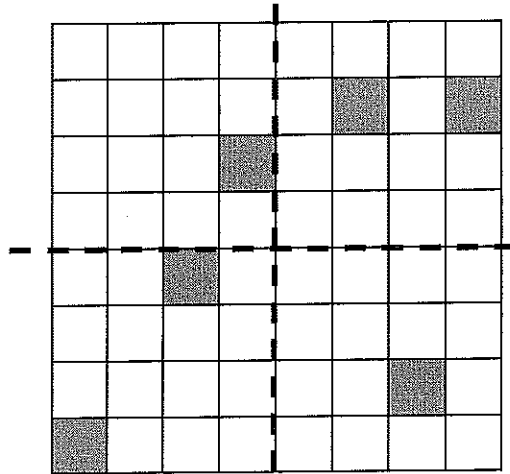
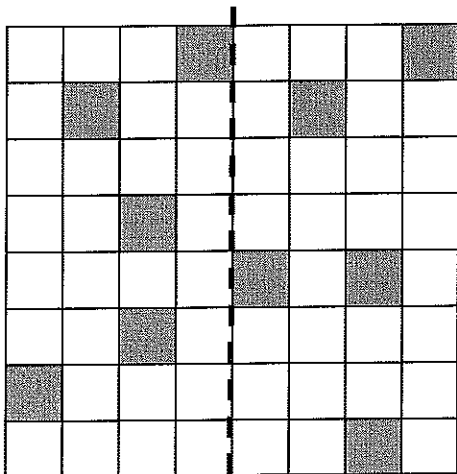


2. (a) Copy the set of axes from question 1.
(b) Plot the following six points :-
 $P(2, 3)$, $Q(-1, 5)$, $R(-4, 3)$,
 $S(-4, -1)$, $T(-1, -3)$ and $U(2, -1)$.
(c) Name the shape formed when the six points are joined up in order.
3. (a) Draw a set of axes from -5 to 5 on both axes.
(b) Plot the points $A(3, 2)$, $B(3, -3)$ and $C(-2, -3)$.
(c) Find and plot a fourth point (call it D), such that ABCD is a square.
4. (a) Draw a set of axes from -5 to 5 on both axes.
(b) Plot the points $J(2, 1)$, $K(4, 1)$ and $L(3, 4)$.
(c) Join the three points and write the name of the shape formed.
(d) Reflect this shape over the x -axis.
(e) Write the coordinates of the vertices of the new shape found.

MNU 4-17b: I can apply my understanding of the 4-quadrant coordinate system to move, and describe the transformation of, a point or shape on a grid.

Exercise 1

1. Copy each diagram and shade just enough sections so that the dotted lines are lines of symmetry:-

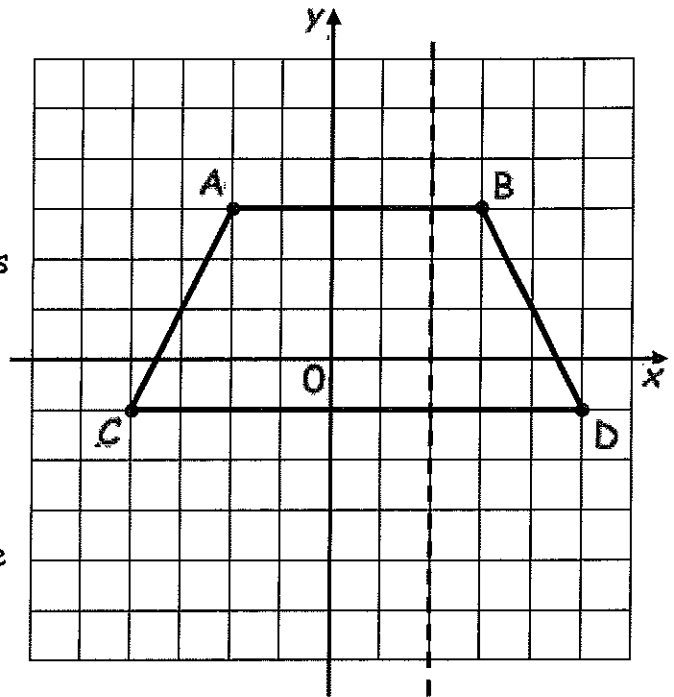


2. A trapezium is drawn with vertices at the points A (-2, 3), B (3, 3), C (5, -1) and D (-4, -1).

(a) (i) Write down the coordinates of A', B', C' and D', the images of A, B, C and D under reflection in the x-axis.

(ii) Copy the axes and draw trapezium A'B'C'D'.

(b) On a separate diagram, draw trapezium A''B''C''D'', which is made by reflecting ABCD in the dotted line.



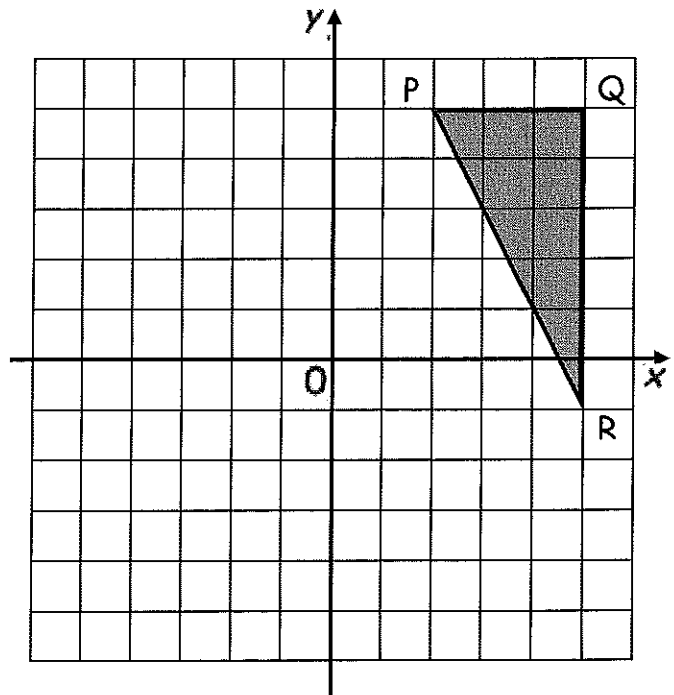
Exercise 2

1. Triangle PQR has been placed on a grid as shown.

(a) Copy the diagram and add the image of PQR under a 90° anti-clockwise rotation about O.

(b) Copy and complete the table:-

Point	Image
P (2, 5)	P' (-5, -2)
Q	Q'
R	R'



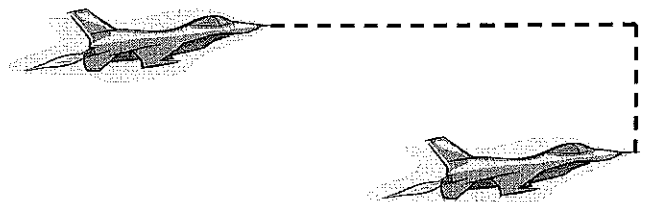
2. Write down the image of each point below after rotation by a quarter turn anti-clockwise about O:-

- (a) Point K (3, 4) (b) Point L (-3, 4) (c) Point M (-3, -4)
 (d) Point N (3, -4) (e) Point P (x, y)

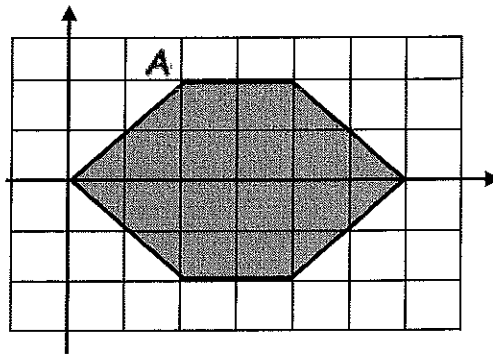
3. Write down the images of points K, L, M, N and P in question 2 after rotation by a quarter turn clockwise.

Exercise 3

1. Describe the translation made by the fighter plane accurate to the nearest millimetre:-



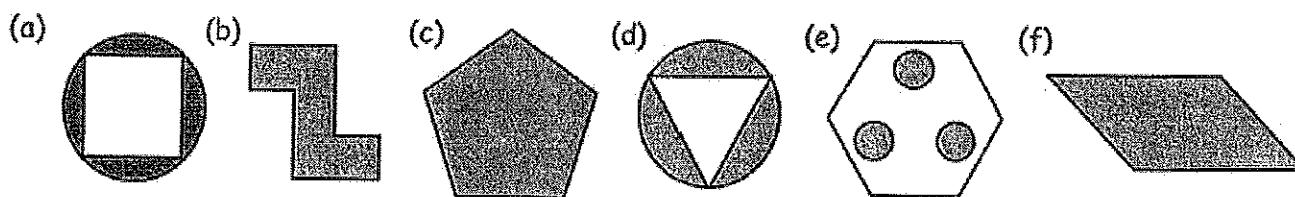
2. (a) Copy the axes and hexagon on to square paper.
 (b) On the same diagram, draw the image of the hexagon after a translation of:-
 (i) 4 right and 2 down
 (ii) 4 right and 2 up
 (iii) 4 down
 (iv) 4 up
 (c) State the coordinates of the image of vertex A after each translation in (b).
 (d) Describe two more translations which, when the images are drawn, would complete a ring of hexagons around the original.



MNU 4-19a: Having investigated patterns in the environment, I can use appropriate mathematical vocabulary to discuss the rotational properties of shapes, pictures and patterns and can apply my understanding when completing or creating designs.

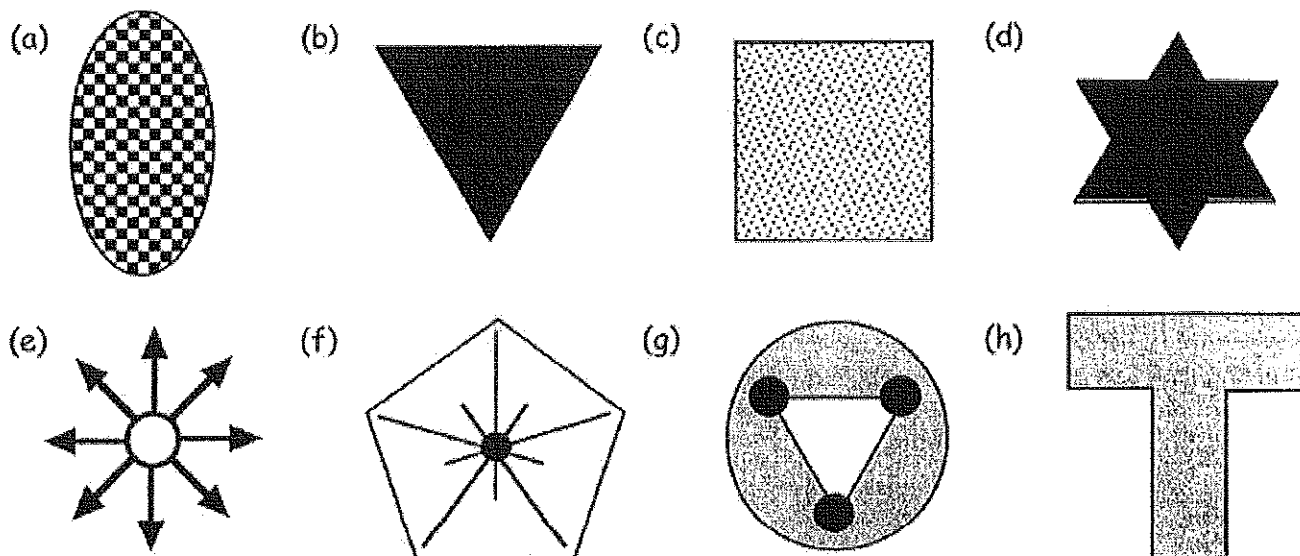
Exercise 1

1. Which of the following shapes have half-turn symmetry?



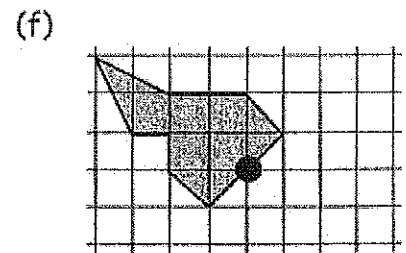
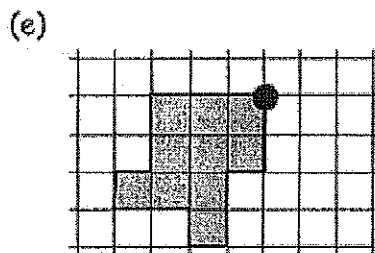
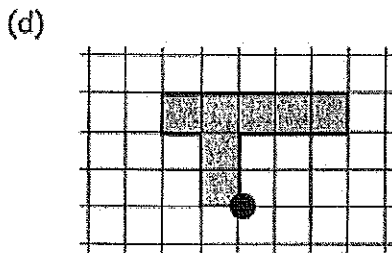
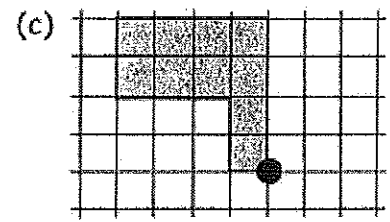
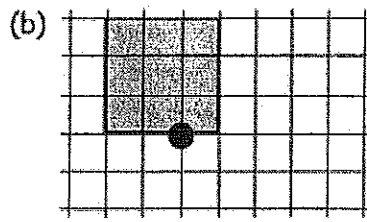
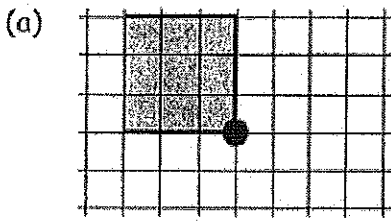
2. Seven capital letters of the alphabet have $\frac{1}{2}$ -turn symmetry.
Which letters?

3. State what kind of turn symmetry each of the following shapes have. ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$), and state the "order" of rotational symmetry in each case.



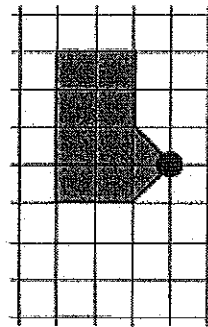
Exercise 2

1. Copy each of these shapes and rotate each one by 180° , ($\frac{1}{2}$ a turn), around the dot.



2. (Tricky!) Copy this shape.

Try to rotate the shape by 90° (a $\frac{1}{4}$ turn) clockwise about the dot.

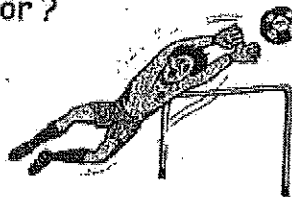


MNU 4-20a: I can evaluate and interpret raw and graphical data using a variety of methods, comment on relationships I observe within the data and communicate my findings to others.

Exercise 1

1. The stem and leaf diagram shows the ages of spectators watching a football match.

- Write a key for the diagram.
- Write out all the ages shown in the diagram.
- How old was the youngest spectator?
- What was the modal age?
- Find the median.



Spectators ages

1	2	2	6	9		
2	0	4	5	6		
3	0	1	1	1	2	4
4	2					
5	0	3				

2. For each set of data shown :-

- Construct an ordered stem and leaf diagram.
- Find the mode and median.