

## CoEA Module 1

## Case Study 2

*Designing a Car Park*

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The resources for this Case Study consist of

Teacher Notes

Worksheet WS1 (2 pages)      *How Many . . . ?*

Worksheet WS2      *Measuring Cars*

Homework Sheet HW1      *Using Your Results*

Case Study Resource Sheet CR1      *Parking Spaces*

Worksheet WS3      *Your Design*

Case Study Resource Sheet CR2      *For Sale . . .*  
(2 pages)

Worksheet WS4      *Car Prices*

Case Study Resource Sheet CR3      *Mazes*

Worksheet WS5 (3 pages)      *Mazes*

Case Study Resource Sheet CR4      *Map*

Homework Sheet HW2      *Map*

Test 1 (2 pages)

# Case Study 2

## *Designing a Car Park*

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### Teacher Notes

Before starting this case study consideration must be given to visiting a car park. Venues such as supermarkets, leisure centres, cinemas or the school could be used. Students need time to measure car parking spaces and to sketch the overall design of the car park.

1. Design a car park on an OHP. Students make an accurate copy of the diagram using 1 cm to 1 m. Interactive session with teacher asking questions such as:  
"How wide would 6 car spaces be?"  
"How long would 8 bus spaces be?"
  2. Do WS1 with questions similar to above. Check the work, especially the sequences at the end of the worksheet. Then do mental test using mainly 2, 5 and 10 times tables but using some others as well.
  3. Practical activity. Measure lengths and widths of cars in the school car park. Record results on WS2. Consideration of units needed. Discuss how the measurements will be taken – suggest chalk marks on the ground!
  4. Explain HW1 for which the results on WS2 will be needed.
  5. Using CR1 and results from WS2, discuss the different possibilities for car park patterns. Which takes up most space, etc. Can they think of a different design?
  6. Using WS3 students design their own car park to fit the given space (30 m × 50 m). Scale drawings should be used. This designing should continue as HW2. It is suggested that templates are provided (or made) for car park spaces. A scale of 1 cm to 1 m should be used. It would be useful if 30 cm × 50 cm paper and 2 cm × 5 cm templates were provided.
  7. Possible extension here – measure land currently available to the school and design a car park for that area. Add in things like: must provide  $x$  number of bus spaces; must have an entrance and a separate exit, etc.
  8. Using CR2 (or a page from a current newspaper) interactive session asking questions about page of car adverts, such as:  
"Which is the dearest Escort?"  
"How much is a Sierra GLX Turbo Diesel?"  
Make sure the questions are not the same as on WS4.
  9. Do WS4 using CR2.
  10. Interactive session on quarter turns, half turns, three-quarter turns, right angles, clockwise and anti-clockwise. Then do WS5: *Mazes*. HW2 is similar.
  11. Following the end of Case Study Test, students should do Practical Exercises, Task 1 – *Squares*.
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# Case Study 2, WS1.1

## *How Many . . . ?*

**You need the following information**

width of a car space = 2 metres

length of a car space = 5 metres

length of a bus space = 10 metres

1. How wide would 3 car spaces be?
2. How much space in width would 5 car spaces take up, next to each other?
3. How long would 4 car spaces be?
4. How wide would 8 car spaces be?
5. How long would 5 bus spaces be?
6. How many car spaces (width) could you fit along a wall 12 metres long?
7. How many cars could fit lengthways in 3 bus spaces?
8. Complete the table:

<i>No. of car spaces</i>	1	2	3	4	5	6	7	8	9	10
<i>Length</i>	5	10	15							
<i>Width</i>	2	4	6							

9. If buses are parked lengthways, how many would fit in 100 metres?
10. How many buses will fit into a space long enough for 10 cars?

## Case Study 2, WS1.2

*How Many . . . ? (continued)*

11. In the table in Question 8 you created three sequences.

The first was: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Write down the other two sequences.

(a) 5, 10, 15, ....., ....., ....., ....., ....., ....., .....

(b) 2, 4, 6, ....., ....., ....., ....., ....., ....., .....

12. Complete these sequences by filling in the next three spaces.

(a) 3, 6, 9, 12, 15, ....., ....., .....

(b) 6, 12, 18, 24, ....., ....., .....

(c) 1, 2, 4, 8, 16, ....., ....., .....

(d) 1, 11, 111, 1111, ....., ....., .....

(e) A, B, A, B, A, ....., ....., .....

(f) X, X, Y, Y, X, X, ....., ....., .....

(g) 1, 2, 3, 1, 2, 3, ....., ....., .....

(h) ▼, ■, ▼, ■, ....., ....., .....

(i) □, ■, ■, ■, □, ■, ....., ....., .....



# Case Study 2, HW1

## *Using Your Results*

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Using your results from WS2 *Measuring Cars*, answer the following questions.

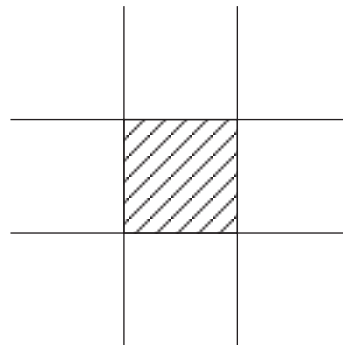
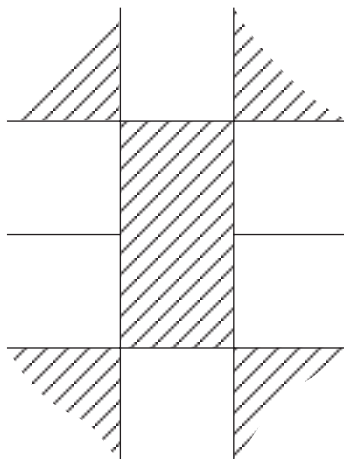
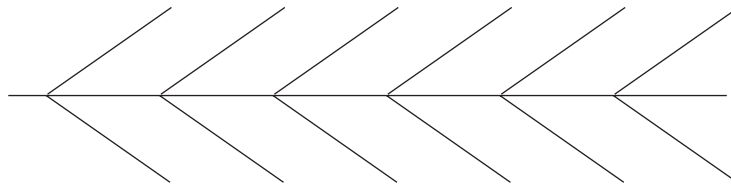
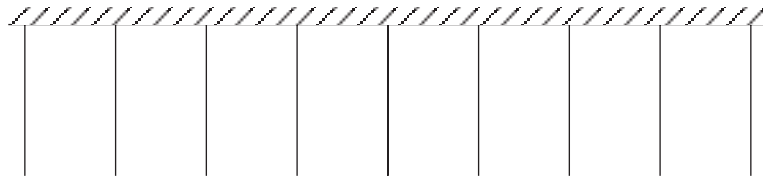
1. Which car is the **longest**?
2. Which car is the **shortest**?
3. Which car is the **widest**?
4. Which car is the **narrowest**?
5. Rewrite your list in order putting the **longest first** and the **shortest last**.
6. Rewrite your list in order putting the **widest first** and the **narrowest last**.
7. Is the same car at the top of both lists? If so, which car is it?
8. Is the same car at the bottom of both lists? If so, which car is it?
9. What measurement for a width would cover **all** the cars you measured?
10. What measurement for a length would cover **all** the cars you measured?

# Case Study 2, CR1

## *Parking Spaces*

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Car Park designs vary a lot depending on how much space is available.  
Here are some for you to think about.



These are just a few possibilities.  
Several different layouts are often  
used together in the same car park.

## Case Study 2, WS3

## *Your Design*

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By now you should have gathered lots of information about cars and car parks. You know how long and wide cars are and how much space is needed for them in car parks.

Fill in the table below to show 5 things that you need to think about when designing a new car park.

1.	
2.	
3.	
4.	
5.	

Your school is being given a piece of land to use as a car park for its staff. The land is rectangular in shape and is 50 metres long and 30 metres wide,

Using your results so far you need to come up with a design that will enable as many cars as possible to fit on the land. You may use any design you like and you can include walls, pavements, flower beds and grass if you want to.

The car park must be at ground level (not multistorey).

# Case Study 2, WS4

## *Car Prices*

### **You will need to use sheets CR2.1 and CR2.2**

Answer these questions using the information on the sheets.

1. Which is the **most expensive** car?
2. How much is it?
3. How much is the **cheapest** car?
4. What make is it?
5. Which is **cheaper**, the VW Polo Fox or the Fiat Uno 45 Fire?
6. There are three cars that are the same price. Which cars?
7. There are two Astra 1.3 Merits for sale. What is the difference in their prices?
8. How many cars cost less than £2000?
9. How many cars cost more than £4000?
10. How many blue cars are there?
11. How many of the cars have sunroofs?
12. Which cars have electric windows?
13. If you wanted to buy a red car with three doors, which car would you choose?
14. You have £2000 to spend and you want to buy a Fiesta. Which one could you buy?
15. How much change would you get from your £2000?
16. List the cars in order of price with the most expensive first. Write down the price and then the make of car next to it.
17. Which car would **you** buy – and why?

# Case Study 1, CR2.1

*For Sale . . .*

The adverts on sheets CR2.1 and CR2.2 are from a car sales magazine.

<p>ASTRA 1.3 MERIT 3 DR.,1989, blue, excellent condition inside and out. 43000 miles, Long MOT. Radio. Bargain at £1795.</p>	<p>FORD ESCORT 1.4 MISTRAL., excellent condition, low mileage, one owner from new. (inc CD player) £5995 ono.</p>	<p>VAUXHALL NOVA 1.2 MERIT PLUS. K reg, immaculate condition. 15 000 miles only. 1 owner from new. Regularly serviced. £2500.</p>
<p>PEUGEOT 205XE 1986, D reg, 66000 miles, pale blue, 3-door in very good condition, tax, MOT stereo cassette. £1395</p>	<p>FORD SIERRA 1600ccLX, 1990, G reg, 5 door saloon, silver, only one former owner. Used daily £2200</p>	<p>FIAT UNO FIRE, 1992 , J reg 5 door, taxed and MOT, average mileage, flame red, sunroof, stereo, very nippy, surely a bargain at £2495.</p>
<p>MICRA COLLETTE E reg, 75k miles, 1 previous, full MOT, Blaupunkt stereo, first to see will buy, a bargain at £1395.</p>	<p>ROVER 216 SL1, K reg in midnight blue, elec windows, central locking, MOT, immaculate condition, bargain £4000.</p>	<p>SIERRA GLX TURBO DIESEL., J reg, in metallic green. Only 63000 miles. Elec windows. Sunroof. 5 speed. 9 mths MOT. Rare car. First to see will buy. Only £3495.</p>
<p>VW POLO FOX, 1991, facelift model, hatchback, white, excellent condition throughout, radio cassette, 41000 miles, 12 months MOT, rear seat belts, ideal ladies car, £2850</p>	<p>VAUXHALL ASTRA 1.3 MERIT, E reg, jade with contrasting interior, radio cassette, sunroof, MOT October, very good condition, £1275.</p>	<p>VAUXHALL ASTRA, F reg 6 mths MOT., 5 speed, red, rear spoiler, sunroof, excellent condition, first to see will buy, £1495 ono.</p>
<p>HYUNDAI PONY, 1988, F reg, excellent condition, 36000 miles, 1 owner, taxed MOT 12 months, £1250.</p>	<p>FORD FIESTA 1989, F reg, 29000 miles, 3 dr, hatch, burgundy, sunroof, MOT Jan, taxed 12 months, £1495</p>	<p>FORD ESCORT 1.3L, 1990, G reg, 47000 miles, blue, 5 dr, sunroof, MOT taxed 12 months, £2650 ono.</p>

## Case Study 1, CR2.2

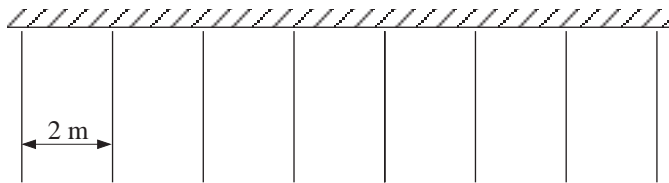
*For Sale . . . (continued)*

MICRA 1.0LS, 1989, sunroof, radio, 46k, 9 months MOT, excellent mpg, well maintained throughout, £1650	SIERRA 1.8L, G reg, 1 owner, blue, MOT, sunroof, good condition, radio cassette, £1395.	VW POLO COUPE 1300S, lady owner, 1988, E reg, 67k miles, maroon, economical, low insurance, 12 months MOT, reluctant sale, £1650
FORD FIESTA 1.1 LX, 1992 K reg, 32000 miles, red, one lady owner, excellent condition, regularly serviced, sunroof, radio cassette, £4250 ono.	SPECIAL EDITION FORD ESCORT 1100 Bonus, 1989, 61000 miles, 3 dr hatch, metallic silver, stereo, sunroof, 12 months MOT. Excellent condition, £1595.	FORD MONDEO 1.6LX, L reg, 20700 miles, 5 door hatchback, blue, good condition, regularly serviced, £6550.
FIESTA. J reg, blue, lady owner, taxed and MOT. Good condition. £3300 ono.	ROVER METRO 1.1C, 1991, J reg, 49500 miles, one owner, 3 door, red, 8 mths MOT. Full service history, warranty included, £2995.	FORD ESCORT LX1 16V, 1994, L reg, 45000 miles, red 5 dr, taxed, sunroof, alarm, elec windows, stereo radio cassette, VGC £6500.
YES!! £1145 NISSAN SUNNY 1300, metallic blue, 2 previous owners, 10 months MOT, e/windows, superb car, any trial, £1145	VAUXHALL CAVALIER 2.0LI, 1992, electric windows, mirrors, sunroof, central locking, PAS, luxury velour interior, red bodywork, service history, £3695.	FIESTA BONUS 950CC, 1989, F reg, black, full MOT, radio cassette, forced to sell at £1250.
FORD FIESTA 1.1 LX, 1993, K reg, 24000 miles, radio cassette, sunroof, 5 speed box, colour coded bumpers, low miles, with CAT, £3995.	FORD FIESTA 1100 POPULAR PLUS, H reg, 79000 miles, radiant red, full MOT, very good condition throughout, £2550.	NOVA HATCHBACK 1.2 FLING, H reg, 3 door, bright red, average miles, stereo, immaculate condition inside and out, £2795.

# Case Study 2, Test 1

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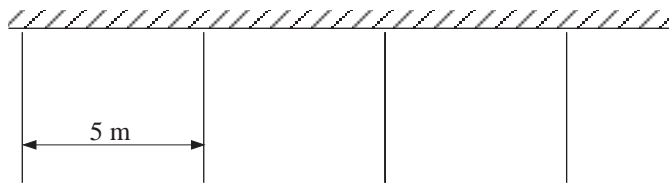
1.



Each of these spaces is 2 metres wide,

- (a) What is the total width of these 7 spaces? .....
- (b) How many spaces would make a total width of 12 metres? .....
- (c) How many spaces would make a total width of 18 metres? .....
- (d) How many spaces would make a total width of 60 metres? .....

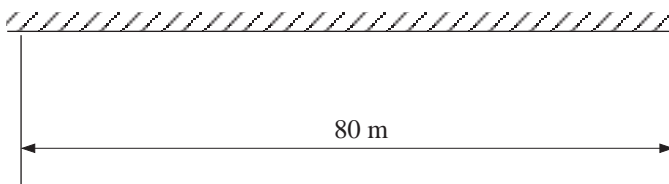
2.



Each of these spaces is 5 metres long. What is the total length of

- (a) 3 spaces .....
- (b) 4 spaces .....
- (c) 5 spaces .....
- (d) 8 spaces .....
- (e) How many spaces would make a total length of 30 metres? .....
- (f) How many spaces would make a total length of 50 metres? .....
- (g) How many spaces would make a total length of 100 metres? .....

3.



How many 10 metre bus spaces will fit here?

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## Case Study 2, Test 1

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4.

<i>Make</i>	<i>Length</i>	<i>Width</i>
<i>ESCORT</i>	363 cm	213 cm
<i>ASTRA</i>	358 cm	198 cm
<i>RENAULT 19</i>	397 cm	210 cm

- (a) Which car is the **longest**? .....
- (b) Which car is the **shortest**? .....
- (c) What is the difference in length between the longest car and the shortest car? .....
- (d) Which car is the **widest**? .....
- (e) Which car is the **narrowest**? .....
- (f) What is the difference in length between the widest car and the narrowest car? .....

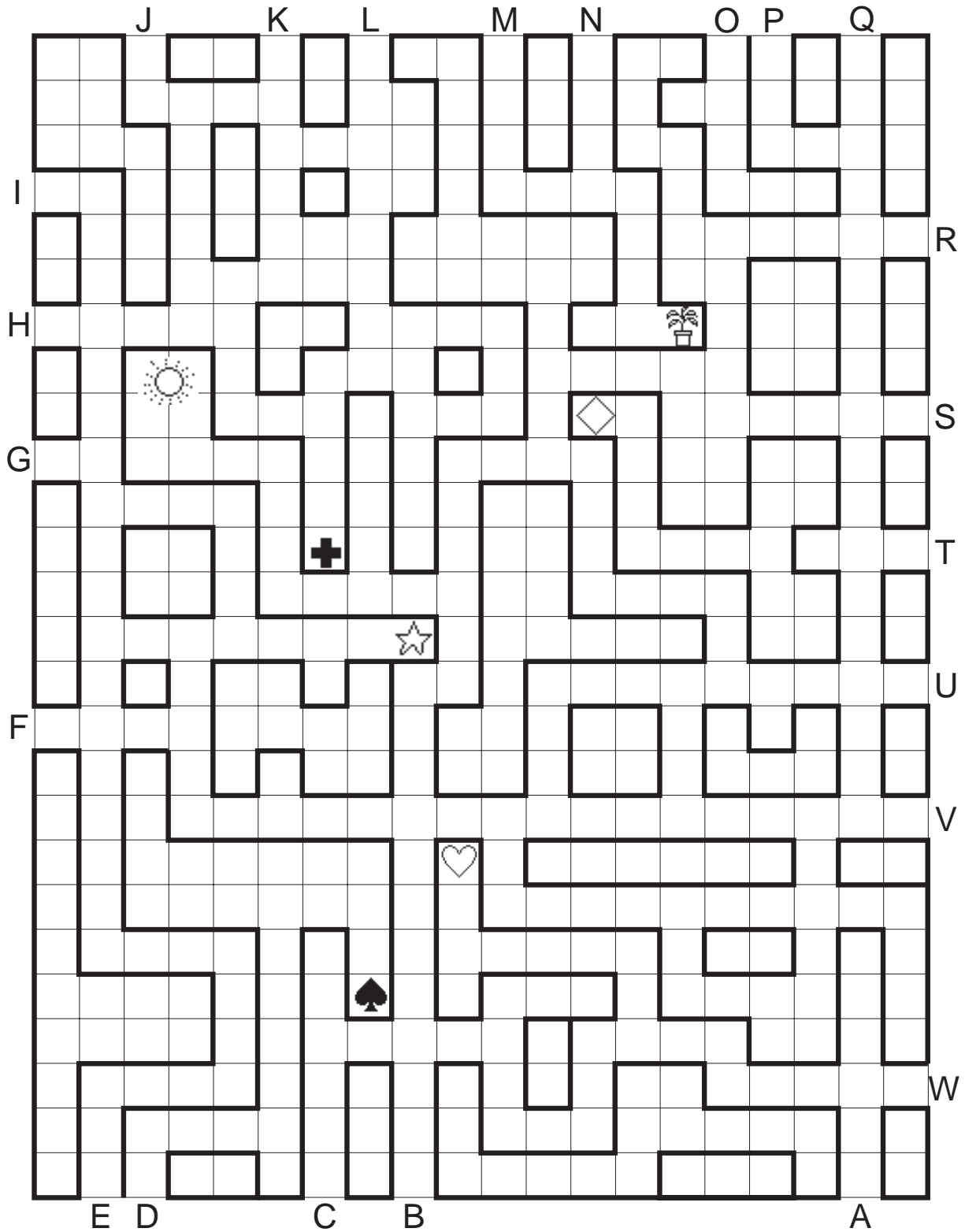
5. Look at these car adverts.

VAUXHALL NOVA ANTIBES 1.2, D reg, average miles, blue, 5 speed, r/cassette, alarm, taxed, MOT'd, excellent condition, £1475	FAST CAR LOW INSURANCE. Peugeot 205 1.4 xs, F reg, genuine 53 000 miles, aztec silver, 5 speed, immaculate throughout, £1995.	CITROEN AX, metallic grey, N reg, 8000 miles, excellent condition, one lady owner, £5995 o.n.o.	£2395, VAUXHALL NOVA 1.2 Merit, H reg, full MOT, superb condition, only £2395.
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- (a) How much is the **most expensive** car in these adverts? .....
  - (b) Which is the **cheapest** car? .....
  - (c) Which cars could you buy if you had £2000 to spend? .....
  - (d) What is the difference in price between the two Vauxhall cars? .....
  - (e) List the cars in order of price.
    - 1st .....
    - Put the most expensive car first. 2nd .....
    - 3rd .....
    - 4th .....
-

# Case Study 2, CR3

## Mazes



Each letter represents an entrance/exit.

# Case Study 2, WS5.1

## *Mazes*

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### **You will need to use sheet CR3**

1. Follow these instructions:

**Start at A**

Go forward 3 squares

Turn **left** and go forward 3 squares

Turn **right** and go forward 1 square

Turn **left** and go forward 3 squares

Turn **left** and go forward 2 squares

Turn **right** and go forward 2 squares

Turn **right** and go forward 2 squares

Turn **left** and go forward 2 squares

Turn **right** and go forward 8 squares

Turn **right** and go forward 1 square

Turn **left** and go forward 5 squares

Turn **right** and go forward 2 squares

Turn **left** and go forward 2 squares

Turn **right** and go forward 4 squares

Turn **left** and go forward 3 squares

Turn **right** and go forward 3 squares

Turn **left** and go forward 4 squares

**Where are you?**

## Case Study 2, WS5.2

## Mazes

### You will need to use sheet CR3

2. Follow these instructions:

**Start at U**

Go forward 5 squares

Turn through a right angle clockwise then go forward 2 squares

Turn through a right angle anti-clockwise then go forward 3 squares

Turn through a right angle clockwise then go forward 3 squares

Turn through a right angle anti-clockwise then go forward 3 squares

Turn through a right angle anti-clockwise then go forward 5 squares

Turn through a right angle clockwise then go forward 1 square

Turn through a right angle anti-clockwise then go forward 3 squares

Turn through a right angle clockwise then go forward 5 squares

Turn through a right angle clockwise then go forward 4 squares

Turn through a right angle anti-clockwise then go forward 2 squares

Turn through a right angle clockwise then go forward 4 squares

Turn through a right angle anti-clockwise then go forward 1 square

**Where are you?**

## Case Study 2, WS5.3

*Mazes***You will need to use sheet CR3**

3. Follow these instructions:

**Start at L**

Go forward 8 squares

Turn right and then go forward 1

Turn through a right angle anti-clockwise then go forward 1 square

Turn through a right angle clockwise then go forward 2 squares




Turn right and then go forward 2

Turn left and then go forward 3

Turn through a right angle clockwise then go forward 3 squares

Turn left and then go forward 1

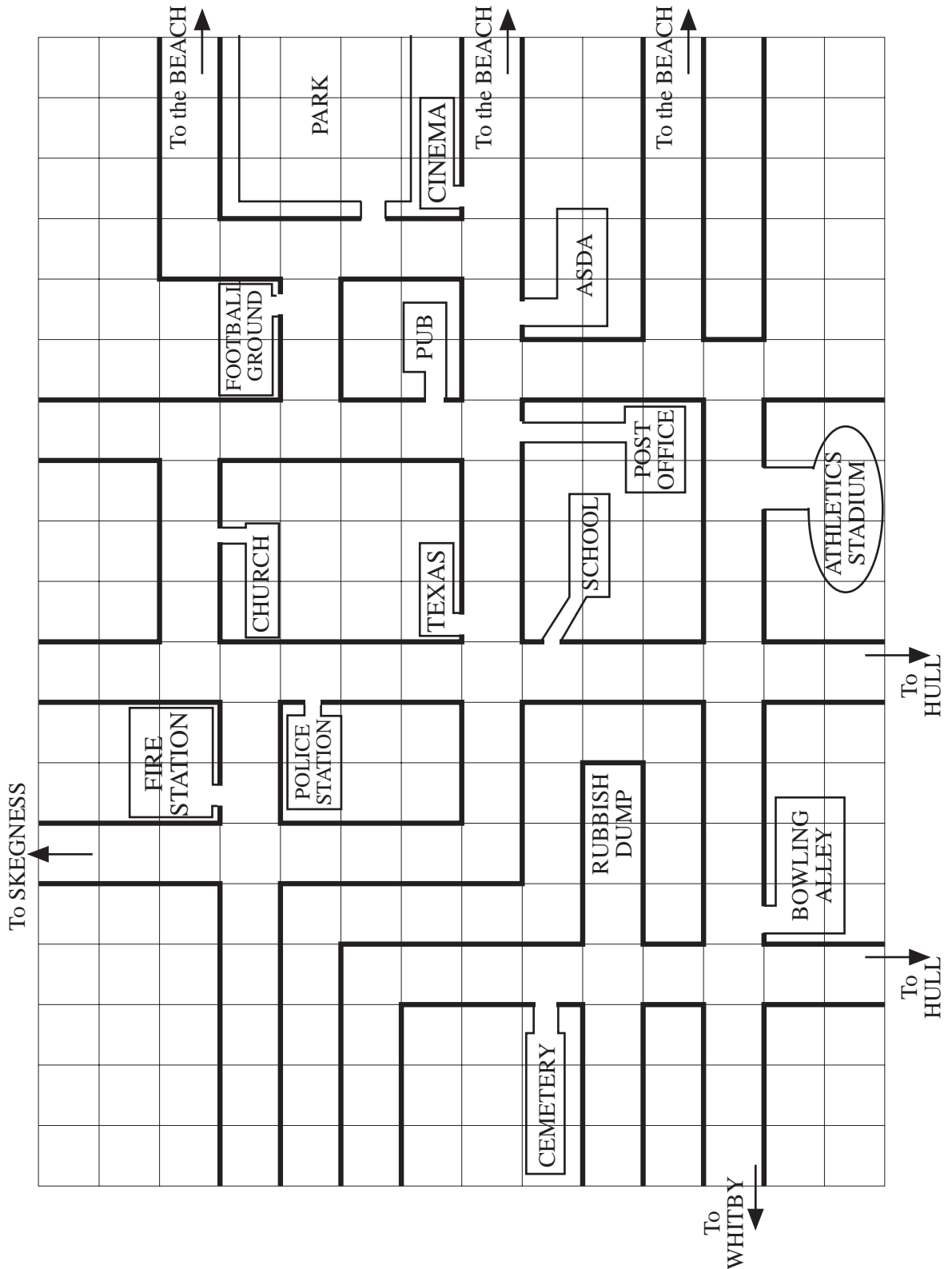
**Where are you?**

4. Which entrance **must** you start at to get to  ?
5. How many left turns must you make to go from **R** to **S** ?
6. Describe how to get from **H** to  .
7. Write a list of instructions using left and right to get from **V** to **W**.
8. Use clockwise and anti-clockwise to direct someone from **R** to the sun symbol.
9. Can you reach  from **S** ?
10. Which symbol can you **not** reach from any of the named starting letters?

# Case Study 2, CR4

Map

### Sketch map of the town of Boston



# Case Study 2, HW2

*Map*

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## You will need to use sheet CR4

Using the sketch map of Boston, answer these questions.

1. Give directions from the **Bowling Alley** to the **Football Ground**.
2. How do I get from the **Fire Station** to the **Post Office**?
3. If I am travelling from **Hull**, which direction is the **Beach**?
4. If I am walking from **Texas** to the **Beach**, is the **Post Office** on my left or my right?
5. Which side of the **Pub** is the **Cinema**, as you look at the map?